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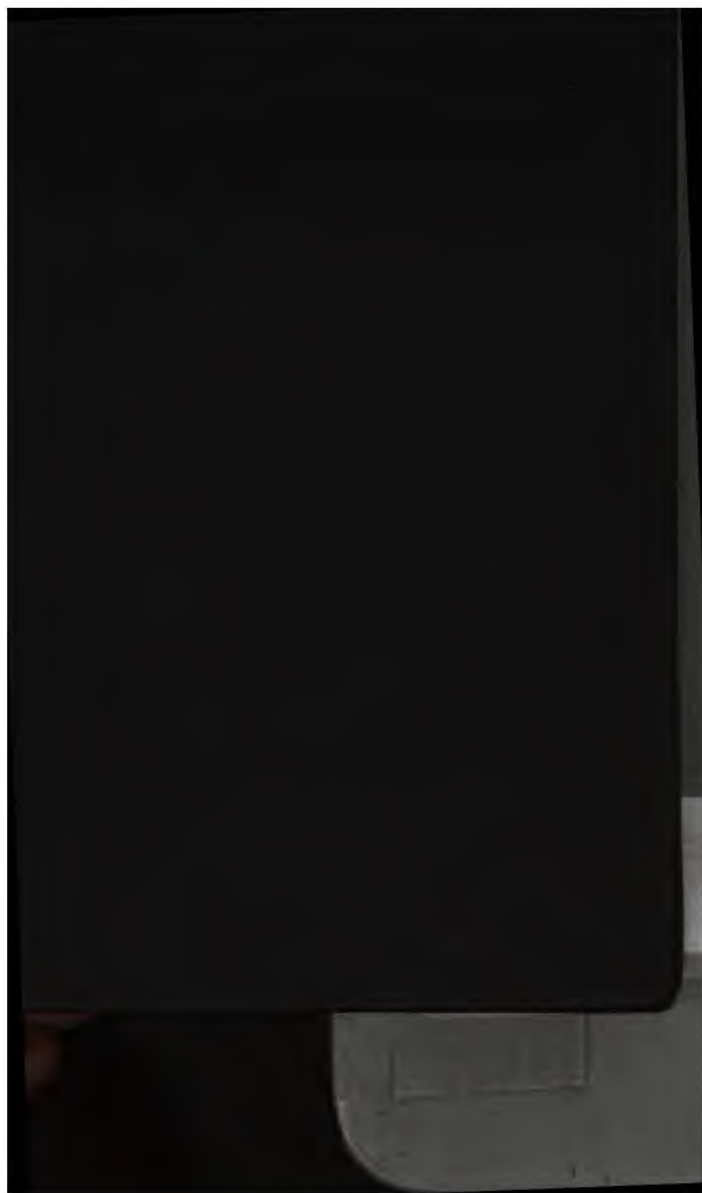
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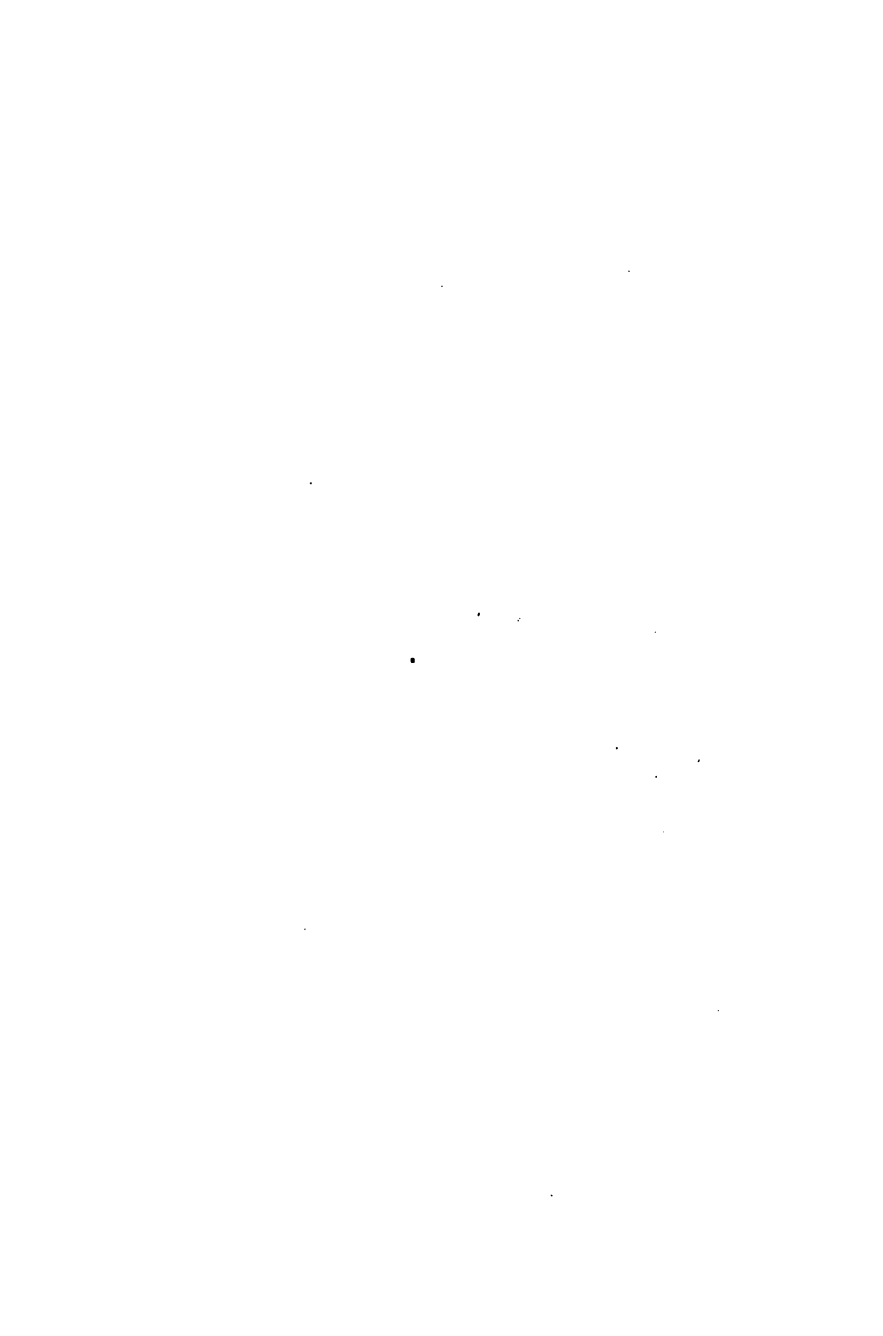
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Eliza Arango
THE

GUIDE TO KNOWLEDGE:



BEING A

COLLECTION OF USEFUL AND FAMILIAR

QUESTIONS AND ANSWERS ON EVERY-DAY
SUBJECTS,

Adapted for Young Persons,

AND

ARRANGED IN THE MOST SIMPLE AND EASY LANGUAGE.

BY ELIZA ROBBINS,

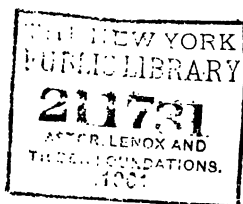
AUTHOR OF POPULAR LESSONS, ETC.

NEW YORK:

D. APPLETON & CO., 90, 92 & 94 GRAND ST.

1871.

★ A. S. FREIDUS



Entered according to Act of Congress, in the year 1852,

By D. APPLETON & COMPANY,

In the Clerk's Office of the District Court for the Southern District of
New York.

NEW YORK
JAN 10 1907
VOLUME

P R E F A C E .

"THE CHILD'S GUIDE TO KNOWLEDGE" is an elementary book which has been much used in England for many years; but, beyond its general scope and details, nationality is a leading feature in the original work. Matters of fact purely local may be useful to be known in that country, which are of no importance whatever in this; while whatever is peculiar to this continent, or to these States, in the economy of nature, or the results of industry, is entirely disregarded in England as subject of instruction to the young.

A book of the character of this should give all the information its bulk admits of concerning the productions and arts of the country we inhabit.

"That which before us
Lies in daily life is the prime wisdom."

I have therefore endeavored to fit a very useful design to the position and wants of the children of the United States, adding to matter of general concern such notices of our natural productions, and their uses, as may be serviceable in popular education, and to the end of life. A right Initiation is the true access to valuable ultimate acquirements.

I recommend this book to teachers for its manifest utility. In the German schools, a little compend of cyclopedic design is always used. Such a book, well written, indicates sciences else never heard of by multi-

tudes of children, assists their observation, and furnishes to them a vocabulary they are not likely to acquire without it. I would commend to teachers to postpone the endless compends of Geography and Grammar till something of the external world, and of the labors of mankind, has been taught to their pupils. All that meets our senses belongs to the world we live in, and has relations of some sort to those who dwell in it—therefore, geography is inseparable from every substance and every law of the material universe; divided from these, it is a dead letter. Geography having been taught in its first definitions, should be constantly referred to in the use of this Guide to Knowledge.

The proper questions to a child are not, Where does cinnamon grow? or, Where is Australian gold found?—expecting an answer solely derived from maps; but, Where, on the earth we inhabit—where, in relation to the spot on which we are—is the island of Ceylon? the continent of New Holland? or any other point on the earth's surface. The pupil so inquired of must stand with his face to the north, and must know the points of the compass. Then his map will tell him which way he would go for the whale of the Arctic Ocean, or to the Spice islands, the land of tea, or to that of the mahogany-tree; he will point to the place in question, and tell what land or water intervenes. Any other mode of teaching geography teaches words only, and no geography, nor any matter of fact, in reality.

The geographical use of this book is more than half its use. I hope every learner who may study it will be required to indicate every place mentioned in it, after the intimation just given. He or she will then practise beforehand, with the aid of school maps, the exercise *demand*ed by the lesson to be recited.

I have made no use of italics in these lessons—I have never found them significant to children; therefore, after the example of Mr. Carlyle, I have employed capital letters in all words of peculiar sense, in order to distinguish such words from the rest of the text.

Every article of this compend has been referred to high authority—to the Penny Cyclopaedia; to that excellent book, Mr. Edward Youman's Elements of Chemistry; to Mr. Emerson's work on Trees; and to Mrs. London's Naturalist. These works are presumed to afford the latest and the most accurate information on the multifarious subjects which the book treats of. So much care and labor can only be compensated by knowing or believing that it must render important aid to the cause of general knowledge, and also to sound morality; that it may become a portion of the foundations of that noble edifice which every reader of good books may build up for the palace of his mind.

ELIZA ROBBINS.

NEW YORK, August, 1852.

EXPLANATION OF SOME TERMS

USED IN THE GUIDE TO KNOWLEDGE.

<i>Amphibious</i> , capable of living both on land and in water.	<i>Larva</i> , the young of insects.
<i>Animalcules</i> , { animals made visible by aid of the microscope.	<i>Lateral</i> , belonging to the side.
<i>Infusoria</i> , {	<i>Mandibles</i> , the two pieces of a bird's bill.
<i>Annulated</i> , marked with rings.	<i>Migratory</i> , coming and going at certain seasons.
<i>Antennae</i> , an insect's horns or feelers.	<i>Multivalve</i> , with many shells or openings.
<i>Bivalve</i> , having two shells.	<i>Olfactory</i> , relating to smells.
<i>Callosity</i> , a hard lump upon flesh, or on a joint, without feeling.	<i>Ornithology</i> , a description of birds.
<i>Canine</i> , of the dog kind.	<i>Oviparous</i> , laying eggs.
<i>Carnivorous</i> , eating flesh.	<i>Pectoral</i> , belonging to the breast.
<i>Cetaceous</i> , of the whale kind.	<i>Pendulous</i> , hanging down.
<i>Columbine</i> , of the dove or pigeon kind.	<i>Predaceous</i> , formed to pursue prey.
<i>Digits</i> , fingers and toes.	<i>Prey</i> , something violently seized.
<i>Digitated</i> , having the feet divided into toes and claws.	<i>Proboscis</i> , the flexible trunk of an elephant.
<i>Dorsal</i> , belonging to the back.	<i>Quadruped</i> , four-footed.
<i>Entomology</i> , natural history of insects.	<i>Reptiles</i> , lizards, toads, and snakes.
<i>Feline</i> , of the cat kind.	<i>Ruminating</i> , chewing the cud.
<i>Gallinaceous</i> , belonging to the hen kind.	<i>Spiral</i> , winding like a screw.
<i>Granivorous</i> , feeding on grain.	<i>Testaceous</i> , covered with a shell, as oysters.
<i>Gregarious</i> , living in flocks.	<i>Tentacula</i> , the feelers of worms.
<i>Herbivorous</i> , feeding on herbs.	<i>Umbrageous</i> , affording shade.
<i>Hoof</i> , the horny covering of a horse's foot.	<i>Univalve</i> , with one shell.
<i>Ichthyology</i> , natural history of fishes.	<i>Zoology</i> , history of animal life.
<i>Incubation</i> , sitting on eggs and hatching them.	<i>Zoologist</i> , one acquainted with zoology.

EXPLANATION OF TERMS

USED IN ARCHITECTURE.

Aloof, a recess.

Altar, a pile of stones, or any frame, on which offerings made in worship are laid.

Amphitheatre, a circular building, to exhibit shows in.

Aperture, a small space left open.

Aqueduct, a channel to convey water from one place to another.

Architect, one who designs and superintends the erection of buildings.

Architecture, the art of building houses, bridges, and ships.

Area, an inclosed space between walls; a floor is an area.

Arena, the middle space of the amphitheatre.

Artisan, a mechanic, not an artist.

Balcony, an open gallery, projecting beyond the wall of a building.

Baluster, the little pillar of a staircase.

Balustrade, an inclosure formed of balusters.

Base or *basis*, a foundation.

Bay-window, a projecting window.

Belfry, that part of a steeple in which bells are hung.

Capital, the head of a column.

Castle, a large stone building, with towers and battlements.

Castellated, built like a castle.

Cathedral, a magnificent church, either Catholic or Episcopal.

Ceiling, the uppermost inclosure of a room or a church.

Cemetery, a place of interment for the dead.

Choir, a compartment of any building set apart for singers.

Circus, a round building for exhibition of spectacles.

Colonnade, a row of columns.

Column, a round pillar of wood or stone; its parts are the base, the shaft, and the capital.

Concave, hollowed like the inside of a bowl.

Convex, the outside form of a bowl.

Conservatory, house for reception of plants.

Cornice, ornamented work between the walls and ceiling of rooms.

Cottage, a small house.

Court, open space before a house, inclosed in walls.

Crypt, a sort of cellar under a church.

- Cubit*, one foot and a half.
Cupola, a dome or round building on the top of a house.
- Design*, a plan or drawing of something intended to be made.
Drawbridge, a bridge made to be lifted and let down.
- Eaves*, the overhanging edges of a roof.
Edifice, any building erected by men.
- Fabric*, also a building.
Facade, the front or face of a building.
Fluting, cavities cut in the whole length of a column.
Foot, measure of twelve inches.
Foundation, the lowest part of any building; that placed on the ground.
Fountain, any edifice larger or smaller, out of which water is made to flow.
- Gaol* or *jail*, place of imprisonment.
- Hall*, a room at the entrance of a house, or a large house entire. [alone].
Hermit, a man who lives quite alone.
Hermitage, the dwelling of a hermit.
Hospital, house for reception of sick persons.
Hotel, a large house, or inn, for reception of travellers.
Hut, the poorest human habitation.
- Infirmiry*, house for diseased persons.
Intercolumniation, space between columns.
- Lattice*, a window slightly barred.
Lazaretto, a hospital in Italy.
Level, a flat surface lying horizontally like a floor.
Library, a room of house to contain books.
Loophole, a narrow opening to look out of.
- Mansion*, a large house.
Mausoleum, a splendid tomb.
Menagerie, a building for reception of rare animals.
Minaret, the slender spire of a mosque.
Mosque, a Mohammedan church.
Mural, belonging to a wall.
Museum, house or room for reception of curious objects.
- Nave*, the middle part of a church.
Niche, hollow made in a wall for reception of a bust or statue.
- Observatory*, a building for observation of the moon and stars.
- Palace*, splendid house, intended for kings, princes, or bishops, in Europe.
Palisades, pales or stakes set up for an inclosure.
Pedestal, the support of a column or a statue.
Penitentiary, house of imprisonment.
Pilaster, a square column set against a wall.
Piles, strong posts driven into earth to support some building.
Pinnacle, the top of a roof or of a spire.

Plank, sawn timber less than four inches thick, and thicker than a board, which is one inch and a half thick.

Portal, a great gate or entrance door.

Portcullis, a grate at the top of an archway over gates, which may be let down or lifted like a window-sash.

Postern-gate, small gate in the rear of a castle.

Pyramid, a building without windows, large at the base, four-sided, and rising to a point called the vertex.

Rafters, inside beams of a ceiling or roof.

Refectory, an eating-room.

Rotunda, a building round within and without, and covered at the top.

Rustic, building with rough stones, or unbarked wood.

Saloon, an elegant room for reception of visitors.

Sarcophagus, a coffin or chest for the dead, made of one stone.

Sash, the frame which holds the glass of windows.

Shingles, slips of thin boards used for covering to roofs.

Spire, a steeple ending in a point.

Steeple, part of a church, commonly formed of a belfry and spire.

Tabernacle, a large tent for religious worship.

Temple, an edifice designed for worship.

Terra-cotta, baked earth.

Transept, a passage across a church.

Vane, a piece of metal, which turns as the wind blows.

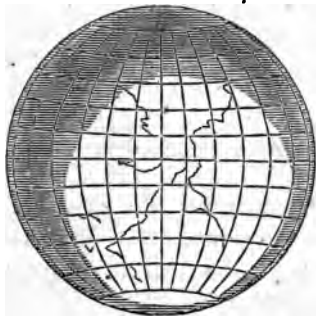
Vestibule, entrance from the house door into the hall, or into a church.

Villa, an elegant country house.

Village, a collection of inhabited houses.

Vomitory, opening out of which people can come forth from a public building.

THE
CHILD'S GUIDE TO KNOWLEDGE.



Globe of the Earth.

XWhat is this world?

It is the earth we inhabit.

Who made it?

God, the Creator of all things.

Where do you find an account of the Creation?

In the Bible, in the book of Genesis.

Who wrote that book?

Moses, the Hebrew lawgiver, wrote it, fit-

teen centuries before the birth of Christ ; more than thirty-three hundred years ago.

Does the first chapter of Genesis mention any thing besides the Earth ?

It describes the creation of Light, the waters above and below the Firmament, the herbs and trees that grow out of the earth, the Sun, Moon, and Stars, the animals of all species, and the first man and woman.

What are all these called ?

All the works of God together are the Universe.

What is the Firmament, and what are the waters above and below it ?

The Firmament is the sky, "the waters above" are the clouds over our heads, and the "waters under the heaven" are seas, rivers, brooks, and springs.

From what does the earth and every thing upon it receive light ?

From the sun, moon, and stars.

Does the earth stand still ?

No, it turns or Revolves around the sun in three hundred and sixty-five days and six hours.

Does any thing support or keep up the earth as it revolves ?

Like a soap-bubble blown into the air, it *floats in space*, and never falls ; always, year

after year, it moves in the same path, called the Earth's Orbit.

Does the earth turn every side to the sun ?

Yes ; in twenty-four hours it turns quite round, which makes both Night and Day to us who live on it.

How is that ?

If I turn one side of an apple towards a lamp, when lighted, that side of the apple will be in the light while the other side is dark ; and when I turn the side which was first in the light from the light, then the side which was darkened will be in the light, while the other side is darkened. So is the Earth turned towards and from the Sun.

What do men and animals do in the night-time ?

They sleep, because they need rest and refreshment ; but in the day, men can see to employ themselves, and animals can feed, or sport, or toil for men ; then they are awake, and know what is around them.

Do all animals sleep during the night ?

Not all ; some birds and insects, and some wild beasts, are awake at night, and seek their food at that time. Some of these are Predaceous, or prey-taking animals ; they are also called the *Nocturnal* animals.

Do any large bodies besides the earth move round the sun ?

Several large bodies, called the Planets, move round the sun. Some of these are nearer to the sun, and others more distant from him, than the earth.

What science describes the heavenly bodies, as these are called ?

The planets and the stars are described by Astronomy.

Who were the first man and woman, and whose parents were they ?

The first male and female were Adam and Eve: they were the parents of all Mankind, of all men and women in the world. All men, women, and children are the Human Race.

Are the human race quite alike in all parts of the world ?

All men and women have not the same complexion and features; there are what are called different races of men.

Can you name them ?

First, the white or Caucasian race, which we belong to; second, the Mongolian, that live in Middle Asia and in some of the islands of the Pacific Ocean; third, the Negro race, of Africa; fourth, the North American In-

dian ; fifth, the Malays, who live in Malacca and in the neighboring islands. These are the varieties of the human race.

How do they all exist ?

By the air they breathe, the food they eat, and by the shelter and clothing they make for themselves.

What do we breathe ?

Air. The whole globe is surrounded with air, as the wick of a lighted candle is surrounded with flame. This air is called the Atmosphere. If it be shut out of any place where we are, we must die.

With what organs do we breathe ?

With the lungs, which are within us ; through the mouth, nose, and throat. Some diseases of the throat and lungs cause death. Some air is wholesome, and some is unwholesome.

What air is wholesome or healthy ?

Air which passes over clean places. Unwholesome air is that which has come over foul or wet places—places which exhale bad odors.

What is breathing ?

Respiration. We Inhale air when we take it in, we Exhale it when we throw it out of *the lungs*.

Can we see air?

No, but we can feel it. When the air moves rapidly, we call it Wind.

What food does man subsist on?

On meat, fish, bread, fruits, garden vegetables, milk, butter, cheese, and eggs.

What is meat?

The flesh of animals that have been killed. The flesh of the ox and cow is beef; of the sheep, mutton; of the deer, venison; of swine, pork.

What are domestic animals?

Those kept about the house, either to perform labor, or to produce food. Wild animals take care of themselves, in the woods and fields.

Do men eat the flesh of wild animals?

They eat the flesh of the deer, the bear, the buffalo, the hare, and the rabbit, besides that of many birds. Some people in China eat little puppies, some in Tartary eat horse-flesh, and the Arabs sometimes feed on young camels.

What is poultry?

It is fowls or birds, such as the hen, the turkey, guinea-fowls, peacocks, pigeons, ducks, and geese, which are domestic birds.

Do these afford any food besides their flesh ?

Hens, guinea-fowls, and ducks furnish eggs, which are eaten by themselves, and are sometimes made up, with other articles, into cakes and puddings.

What wild birds are eaten by man ?

Partridges, wild geese, wild ducks, wild turkeys, pigeons, woodcocks, quails, grouse, and some others.

How are these taken ?

Sometimes they are shot, and sometimes they are taken in snares, or in traps, by the fowler. These wild birds are called game. Dogs called Pointers and Setters sometimes help to find and chase game.

Where is fish found ?

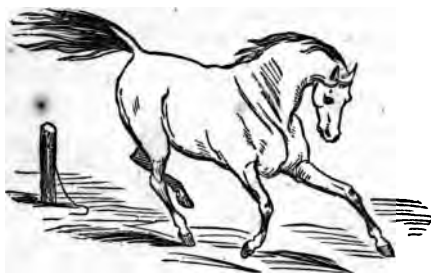
In the sea, and in lakes and rivers.

What are the best fish for the table in our country ?

Salmon, cod, halibut, blackfish, bass, mackerel, herrings, and eels. Besides these, we eat oysters, clams, crabs, lobsters, and turtle, which are not fish, but are found in water. They are, however, often called shell-fish.

Do we cook all these different articles ?

We do. Man alone uses fire to prepare his food: he has been called a cooking animal. Flesh and fish are called animal food, as are *milk and its products*. and eggs.



A Horse.

What animals afford milk ?

Human beings, and all quadrupeds. The milk-giving animals are called the *Mammalia*. Milk is designed for the food of the young animals ; but the parent will sometimes give milk after the young are taken from her.

What are quadrupeds ?

All four-footed animals, from the little mouse, the least, to the elephant, the largest of all.

Is the milk of all animals useful to man ?

No ; cow's milk, ewe's milk, goat's milk, reindeer's milk, and sometimes asses' milk and mare's milk, are used for nourishment, but not that of the wild animals.

What are the products of milk ?

Butter and cheese.

Where does all food come from ?

Out of the ground. Grain and grass, berries and nuts, feed what are called the herbivorous, or herb-eating animals, and man uses grain for his food.

Are there any other animals besides the herbivorous ?

Yes, the Predaceous, or prey-taking. These seize other animals, and feed on them, as the wolf seizes the sheep, the fox seizes the goose ; and the vulture, eagle, and many other birds, devour any smaller animal they like for food.

How do the Predaceous animals get their food from the earth ?

They feed upon the herbivorous animals, who first feed on vegetable food.

What is vegetable food ?

Whatever is produced by any plant, whether it be the root, fruit, stalk, or leaf of the plant which is used as food.

Then it is not cruel or wicked to kill animals for food ?

No, it is not cruel, because God, who made us, gave men and animals an appetite for animal food, or a liking for it.



Do we injure animals by taking their lives ?

No ; men feed and make animals comfortable, that they may make good meat when slaughtered. The domestic animals were ~~were~~ ^{given} ;

live, nor be happy at all, if man did not keep them for his uses. Now they are happy until they are killed.

Must all our appetites be indulged?

Not as much as will hurt us, but as much as will do us good.

What is the effect of excessive eating and drinking?

Excessive eating will make us stupid and ill; excessive drinking will also hurt our minds and bodies. Enough, not too much, is a good rule.

What are excess and moderation?

Excess is too much indulgence, or too much exertion. Moderation signifies doing or saying what ought to be done or said gently and quietly, thinking at the time what we ought to do and say.

If men or animals have not enough to eat, what happens to them?

They feel want; they are hungry and thirsty; they famish, and sometimes die for want of food.

If little children have only very poor or bad food, what happens to them?

They are weak and sickly, and do not grow up to be strong men and women.

Ought we who have plenty of food to be very thankful?

Yes, and never devour more than is enough
Butler.



Ears of Wheat.

Where are vegetables found ?

All over the earth, except in deserts of sand.

What are the chief kinds of plants or vegetables ?

Herbs, shrubs, and trees, besides fungi, mosses, and algæ. Algæ are seaweeds that float in the water.

How do you know these different vegetable families ?

Herbs have no woody stalks, as grass and corn ; shrubs have slender branches of wood, as the rose-bush ; trees have thick trunks, or boles of wood, as the pine and the oak ; the *fungi* grow like mushrooms, without leaves ;

and the mosses cling to wood and stones, and sometimes to the soil itself.



What science describes vegetables?

Botany.

For whose use are animals intended?

God, when he made the first man and woman, said, "Let them have dominion over the fish of the sea, and over the fowl of the air, and over all the earth." He also made animals to be happy.

What is meant by man's "dominion" over these?

That he has a right to possess them, to use them, and to improve them when he can, and to do them no harm, for his sport and pleasure.

How is food obtained by each person?

Some persons supply others by their labor and care, and some supply themselves by labor.

How do we in general get our food?

We buy it, or pay for it. We consume it; others provide it. We are Consumers. The providers of it at first are Producers. Farmers and cultivators are producers.

Do the same kinds of food serve the people of all countries?

No; different countries have different climates. Some are warmer and some colder

than others, so that some kinds of animals and some sorts of vegetables are found in one country that do not flourish in another.

When a plant belongs to a country, and grows wild in it, what do we say of it?

The native plant is Indigenous to that country; but if a plant be brought from a distant country, it is foreign, or Exotic. Grass is indigenous with us, but the tea-plant is exotic, because it comes from China.

When we say a plant is Naturalized, what do we mean?

We mean that, though at first brought from another country, it now grows and thrives in this.

By what arts do men obtain food?

By hunting, by pasturage, by fishing, by Agriculture, and Horticulture.

Who practise hunting, or chasing wild animals for food?

Savage men, and people in new countries, who do not find time to feed, shelter, and rear domestic animals, or who do not understand the care of them.

What is meant by pasturage?

The keeping of herds and flocks, such as cows, sheep, and goats, in large numbers, taking them to graze or eat grass in fields, and then using their milk and flesh for food.



A Flower

What other arts did you mention ?

Fishing (which is drawing fish out of water) and Agriculture.

What is agriculture ?

Agriculture is ploughing the fields, sowing seeds in the soil, keeping it clear of weeds, and taking in the crop.

What is the crop ?

The corn, wheat, or any other grain taken from the field when they have done growing.

What is the Harvest ?

It is taking the crops out of the fields, and conveying them to the barn, for the use of

man and beast. After harvest, every year, in most of these States, the chief magistrate appoints a day of Thanksgiving—a day for all people to thank God, who gives “rain and fruitful seasons.”

What is Horticulture?

It is the cultivation of gardens, where vegetables for the table and flowers are planted.

What is a fertile soil?

The soil that affords abundant growth of vegetables is Fertile. Sterility, or barrenness, is opposite to fertility. A travelled road is sterile.

What is famine?

It is scarcity of food. Famine seldom happens in these days, because cultivators take great care to prevent it, and food from one country can be sent to another.

What are Orchards?

Plantations of fruit-trees—as apple-trees, peach-trees, &c.

XX

What is one of the most important articles of food?

Bread, which is made of the flour of wheat, of rye, of Indian corn, and barley. All these are graminæ, or grasses, and the grain which makes bread is the ear or seed of each.

Is the grain prepared for bread ?

If one breaks a grain of wheat, he will see that the outside is a dry brown husk, within which is a white substance. This last makes bread, when the wheat has been ground in a mill.

Who grinds it ?

The Miller. The mill is either a water-mill or a wind-mill. Two large heavy stones, one over the other, are turned round, while the wheat is poured on them. The stones grind it to flour, and it falls into a reservoir below.

What makes flour white ?

The brown husks are sifted or bolted out, leaving the white flour. The husks are then Bran. Brown bread is made by leaving some of the bran with the flour.

Is bread made of any grain besides wheat ?

Bread is often made of the meal of rye, Indian corn, oats, and barley ; but wheaten bread is the dearest when bought, and is thought to be the best.

What people prefer other bread to that of wheat ?

The people of the Southern States like bread made of Indian meal, called corn bread ; and they of Scotland and Wales eat, with preference, cakes made of oatmeal.

What are the elements of flour?

Flour contains starch, gluten, and a little sugar. Starch is a sticky substance; so that when we make thin paste of flour, the starch contained in the flour makes the paste sticky.

Have you seen paste used?

I have seen paper fixed to the wall by means of paste spread on the paper. It dried, the paper adhered to the wall, and remained there.

What made the paper adhere to the wall?

The starch which is in flour. Preparations of flour are very nourishing.

What is nourishment?

To nourish an animal is to keep it alive with proper food.

Is a man or a child an animal?

Our bodies make us animals, but our minds make us intelligent beings, which cats and dogs are not.

What are they?

All beings on the earth, except man, are brute creatures—not Rational, like human beings.

What is Dough?

It is flour and water mixed together; but the mass is close and heavy until some yeast or fermenting substance, called Leaven, is added to it.



What effect has the Leaven ?

Cooks call it Raising the bread, which means that the leaven swells the dough, so that it takes up more room, becomes light, and when baked is fit to be eaten.

Does the word Bread always mean bread only ?

It often means all necessary food. "Give us this day our daily bread" signifies, Be pleased to give us needful food.

Does Christ speak of the Bread of Life ?

He does ; but he did not mean bread to be eaten. Bread, in the gospel, means instruction, truth, knowledge, and piety.

Why think you that is its meaning ?

Because, as bread nourishes our bodies, so will truth and piety nourish our souls—make us better, wiser, happier every day.

Can Starch be separated from flour ?

It can. A quantity of flour is mixed with water, set in the sun, or in a moderate heat, and, after a time, the starch falls to the bottom of the vessel, and the rest of the flour remains upon the surface of the water.

What is then done ?

The upper portion is taken away, the starch

is dried, having a little Indigo mixed with it to make it bluish. It is broken into grains, packed up, and sold.

What use do we make of starch ?

We boil it in water, make it thinner or thicker as we like, and then stiffen muslin and other articles of wearing apparel.

Is starch found in other vegetable substances besides flour

It is found in the grains, seeds, roots, fruits, and stems of many plants. Some of these contain more, and some less, starch. Four-fifths of Indian corn are starch. This gives us corn-starch, which is nice food.

Can you tell me some of the vegetables that contain starch ?

Potatoes, Beans, Sago, Arrow-root, and Tapioca.

For what are some of these used ?

Potato starch is used like flour starch. Sago is the pith of a palm-tree growing in the Asiatic islands. Arrow-root is made from tubers growing in the West Indies. Tapioca is from the root of a South American plant.

Are these substances ever cooked ?

Sago and arrow-root are cooked for sick people, and for nourishment of infants. Tapioca is made into puddings.

What are Tubers ?

They are balls or knobs attached to the roots of some plants. Potatoes are tubers.

What is Maccaroni ?

It is a peculiar preparation of fine wheat flour. It comes chiefly from Italy. It looks like so many pipe-stems broken into pieces, except that it is of a yellowish color. The people of Naples like it very much.

Does Vermicelli resemble Maccaroni ?

It is made like it, except that it is in small strings, looking like so many worms. It is used in soup.

What is Rye ?

A grain sometimes made into bread, and sometimes Distilled.

What is distillation ?

Heating some grain or liquid until there rises from it a spirit called Alcohol, which makes whiskey, gin, rum, or brandy, according to the matter distilled. Many vegetables contain alcohol.

What is distilled from Barley ?

Whiskey and malt are made of it.

What is Germination ?

If I put a seed or grain into the ground, it puts out little leaves, which would run up and

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make the stalk, leaves, and seeds of a new plant. The first growth of a seed is the Germination.

Do you plant barley to make malt?

No; a large heap of barley is wetted, and soon sprouts or germinates, but is not suffered to grow. It is put into a sort of oven, called a Kiln, and heated just enough to dry it, and stop the Germination. Then it is Malt.

What is done with malt?

It makes porter, ale, and beer, when manufactured.

How are these liquors made?

To make ale and beer, hot water is poured on malt, as we pour it on tea to extract the color and flavor of the leaves. The water draws out the flavor from the malt and makes Wort.

Is Wort beer?

It is not beer until it has been boiled with hops. When this mixed liquor is cooled, some yeast is put to it, and, after a time, the whole becomes beer.

Why is yeast added?

To make the mixture work, or Ferment. The yeast puts it in motion, throwing up whatever is in the liquor which makes it thick; it

soon becomes clear, making more yeast, which is taken off the top of the liquor, and the beer, or ale, is drawn off into casks for use.

What are Hops ?

Hops are green flower-buds growing on vines. Hops are cultivated in fields, and the vines are twisted on poles. The hops, when ready, are sold to the Brewer, who makes beer in a great house called the Brewery.

Is Porter made like beer ?

Very much, but it contains more alcohol. We say that porter and some kinds of ale are stronger than beer; that is, a great quantity of either being drunk will intoxicate.

What is intoxication ?

It is an effect of wine, spirits, cider, and strong beer taken into the stomach.

What is the effect ?

Intoxication often makes a person foolish or crazy, forgetful, and offensive to others, and at last makes him ill, and sometimes causes death. It is often called Inebriation and Intemperance.

Does the Bible forbid this practice ?

It does, saying, "Whether ye eat or drink, or whatever ye do, do it to the glory of God." We do not honor God when we abuse ourselves.

What are oats ?

The seeds of an annual plant, which are given to horses for food, besides being ground into oatmeal for the use of man.

What is an annual plant ?

One, the seeds of which require to be sown every Spring, if we would have any crop in Autumn. The seeds of such plants ripen in one Summer, and are ready to be sown the next year.

Are all vegetables annual ?


Many are Perennial, as asparagus and trees, which keep alive many years.

Are vegetables alive ?


They have a life of their own, because they grow from seeds until they bear seeds and fruit.

Are fruit and seeds the same things ?

Fruit, as cherries and apples, contains seeds ; and each cherry or apple, put into proper soil or earth, will produce a tree. Growing and producing make Vegetable Life.

 What is our life ?

The same as vegetable life, with Intelligence and the power of Locomotion added to that life.



What is Intelligence ?

Thinking much or little. A man has more intelligence than a dog.

What is Locomotion ?

The power to move from place to place ; to use one's limbs as one likes. The power of Locomotion enables me to walk and run. Feeling pleasure and pain belongs to animal life only.

What is an Organized being ?

One that has Organs. Organs are a particular part of the animal or plant designed for a particular use.

What Organs have you ?

I have eyes, ears, nose, tongue, lungs, and heart, besides my limbs and other organs.

For what are these organs given to us ?

The eye is the organ of sight, the ear of hearing, the nose of smell, the tongue of speech, the lungs of respiration, and the heart helps the circulation of the blood.

Have the lower animals these organs ?

Not exactly in the shape of ours, but they are organized beings, else they could not eat, run, creep, or fly, neither could they see, hear, breathe, and feel.

Have plants organs ?

They have roots, stalks, trunks, leaves, and seeds. The flower belongs to seeds. When its petals (its colored leaves) fall off, a seed remains, which is afterwards fit to be planted.

Are gold, silver, and stones organized ?

They have no organs. Look at every part of a stone, or break off a piece of it—the whole is alike.

What are Minerals ?

They are substances without organs, that form the earth, or are found beneath its surface—such as chalk, clay, metals, and stones.

Are minerals useful to man ?

Man, with his mind, and with his hands, makes many uses of minerals. With his mind he contrives machines, with his hands he uses machines, and, by aid of the machines and of fire, he makes the minerals useful.

By what instrument is man distinguished from the lower animals ?

By his Hand. Monkeys have hands, but they have not intelligence to use their hands as a man uses his. The end of an elephant's trunk a little resembles a thumb and finger, but it is far less perfect than a human hand.

What is an instrument ?

It is what is often called 'an Implement or

Tool. It is a thing that can be used to perform some action. A knife is an instrument for cutting, and a crowbar, or lever, an instrument for lifting. A hand is a Natural instrument, and so is an insect's sting.

Can you describe Rice ?

It is a fine grain, white when the husk is removed, and very nutritious. It is cooked in many ways.

Is rice indigenous to America ?

We have wild rice in some of the Western States, but that kind we use at our tables was first brought from Asia to England, and from England to Carolina.

Is rice much eaten in Asia ?

Poor people in China seldom have any other food, and the Malays also subsist chiefly upon it. It is cultivated in the north of Italy.

What is the best rice in the world ?

That of Carolina ; the grains of it, in size, are twice those of Asiatic rice.

Does rice require much water to make it grow abundantly ?

So much, that the rice fields must be in a wet soil, and may be flooded by a river. To work in rice grounds, or to reside near them, is *unhealthy*.

In Carolina, who chiefly cultivate rice?

Negro slaves, upon rice farms, or Plantations. Rice is a profitable article of Commerce.

What is Commerce?

It is the Selling of things we possess to others who need them, and the Buying of what we need; one person taking money, and the other giving it for goods.

What does commerce depend much upon?

Upon transport of articles, chiefly upon rail-cars and navigation. Cars and ships convey commodities from one place to others very distant. Rice may be carried to England from this country, and tea may be brought to us from China.

Who pursues commerce?

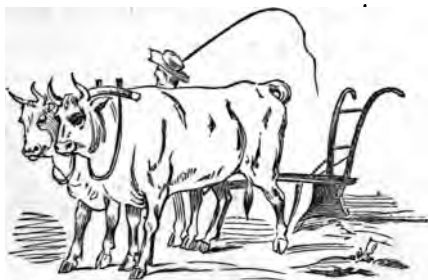
The Merchant, and those who assist him.

What are kine?

Cows and oxen. The bull is the proper male, the cow the female, and the calf the little one.

Are these animals mentioned in the Bible?

They are. The "cattle on a thousand hills" mean cows and oxen. It is written in the Hebrew law, "Thou shalt not muzzle the ox that treadeth out the corn."



Oxen Ploughing.

What does that mean?

Thou shalt not tie up his mouth, to prevent his eating when he is hungry.

How ought the ox and all other domestic animals to be treated?

With care and kindness. They should be well fed, and not over-worked. The Bible says, "A merciful man is merciful to his beast"—to the beast that labors for him.

How is the ox useful to man?

He carries heavy loads for him of hay, corn, stones, or any thing he wishes to transport. Two oxen are commonly fastened together by a yoke across their necks; each head being made fast to the yoke by a wooden bow, which is put upon their necks.

Do oxen tread out our corn or wheat?

Our farmers beat off the grains from the

straw with two sticks tied together, called a Flail. The Hebrews used to make the oxen tread upon the grain until they had broken off all the ears. The broken straw is the Chaff.

What other service do oxen perform?

They help to plough up the soil, that it may be prepared for the seed to be sown. The Egyptians, a long while ago, worshipped oxen, and made images of them, because they were so useful to man.

Have any people now a great regard for cows?

The Brahmins, some people in India, honor cows as holy beings. They would on no account kill a cow or calf.

Are oxen and cows useful after death?

Their flesh, bones, hoofs, horns, hair, and skin are all useful. Their flesh is Beef; their bones are ground in a mill to make manure; their hoofs and the foot-joint are made into glue; their horns make combs; their hair is mixed with mortar, and their skin makes sole-leather.

How is the cow useful when living?

She produces milk, which makes butter and cheese.

Is milk all of one substance?

Milk contains whey, salt, curd oil, and a

little sugar. These are all mixed in the wholesome white fluid the cow affords.

What is Cream ?

The oily part of milk. If the milk is set in a broad pan, the heaviest part falls to the bottom, and the lighter part, which is cream, rises to the top of the pan.

Of what is Butter made ?

Of the milk before the cream rises, or of cream only, for the cream contains all the butter.

How is butter made ?

By moving the milk or cream rapidly ; this is best done in a Churn. A churn is a wooden vessel into which the cream is put and beaten with a Dash.

How is this done ?

The dash is a flat piece of wood at the end of a staff ; the staff passes through the top of the churn, and the cream is beaten with it until the butter appears.

Is there any other sort of churn ?

The farmers in New-York State use what is called a Dog-churn. The dog is made, by *climbing up and down* a movable board, to

turn the box containing milk or cream till the butter is formed.

Do people in all countries use butter?

Much butter is not used in hot or in very cold countries. In very hot countries butter soon turns rancid; it then has a disagreeable taste, and is unwholesome. In very cold countries cows will not thrive. The poor Greenlanders and Esquimaux have neither butter nor bread.

What do they use instead?

Dried fish and fish oil. People learn to like the food with which Providence supplies them, for they can get no other.

What is sometimes used instead of butter in Europe?

In Italy, Spain, Portugal, and in the South of France, little butter is used; Olive-trees in these countries supply olives, from which the oil is extracted, which we call sweet oil; this is often used instead of butter.

What is Ghee?

It is the name of butter made in India from buffalo's milk. The buffalo resembles the ox and cow, and is made to work in Italy like the ox.

What is Cheese?

It is the curd of milk, dried, and pressed into a mass. A piece of Rennet, which is the

stomach of a calf, dried and salted, is put into milk, and that turns it to curd.

Does the whole of the milk become curd ?

The milk, in order to make cheese, is set in a kettle over the fire; the rennet is put into it, and very soon it is turned to curd and whey.

What is then done to it ?

The curd is strained off from the whey, very dry, and salted; it is then broken up by the hands of the dairy-woman, and put into a cloth, which is placed in a round wooden band, just of the size of the intended cheese. It is then pressed in a frame made for the purpose, and after it is kept long enough is fit to be eaten.

Is there but one kind of cheese ?

There are several kinds made in different countries : some flavored with sage and other herbs.

Where are cheese and butter made ?

In a cool room, called the Dairy, fitted for the purpose. Milk should be kept cool. To make cheese, requires much milk. It is made where there is much grass for the cows, and where many are kept.

Can you tell me of any other animal products ?

Lard, the fat of swine ; Tallow, that of sheep and kine ; and suet, Fat often cut from pieces of beef. Lard serves to fry with, tallow makes common candles, and suet is used in cooking. Lard is also mixed by the apothecary with salves and ointments.



Do all persons know how to read and write ?

No ; many persons in all countries are never taught because there are not schools for all children, and some live too far from school to attend.

What is a Public school ?

One where children may be taught without paying for instruction.

Who pays the masters and mistresses of these schools ?

The Public pays the instructors, and also *pays for the school-houses.*



What is meant by the Public ?

The public means all the persons who live in one society of people ; in the same city, or town, or village.

How do the public pay for the school ?

All persons who have Property, that is, house, land, or money, give each a little money to support the school ?

Do they all give the same ?

The person who has much money gives more, and he who has very little gives little ; this money, all together, is the School-tax.

What is a Tax ?

Money that all persons pay for something useful to all.

Can you give an example ?

Money that all pay for lighting the streets of a large town or city, at night, that all may not be in darkness when they are abroad, is a tax which makes every body more safe and comfortable when they go out at night.

Why are there not schools everywhere ?

Because some people are too poor to pay for a school ; and some do not know enough to know how useful learning is.

What is a Community ?

All persons who live in society, and who are governed by the same laws.

What is a Colony ?

It is a company of people who leave their own country to live in another; but still being governed by laws, and sometimes by magistrates, sent from their former country. Surinam is a Dutch colony, and the island of Jamaica is a British or English colony.

What is meant by the phrase "Mother Country ?"

It is the country from which colonists have emigrated. Colonists of a distant country are Subjects; residents in a free country are Citizens.

What is a Free country ?

One in which the citizens choose their own magistrates or rulers, and make their own laws.

Who make the Laws ?

The citizens choose certain men among themselves to meet and make laws for the community : these men are the Legislators.

Had people always books to read ?

Books for all people were not known to the Ancients.

Who were the ancients ?

The ancients were men and women who lived many centuries ago, as the ancient Romans who lived in Italy, and the ancient *Greeks in Greece.*

What is a Century ?

It is one hundred years. It is eighteen and a half centuries since the birth of Christ. We say, now, this present year, A. D. 1852. Our time, now, is in Modern times.

What is meant by A. D. ?

It signifies Year of our Lord, which is Anno Domini, in Latin.

What is Latin ?

The language of the ancient Romans.

Is Latin spoken now ?

Latin is very seldom spoken now, but it is often studied and read.

Why is Latin studied ?

That the learner may be able to read the books written long ago in that language.

Are any other ancient languages studied ?

Hebrew, Greek, and some others.

What books were written in these languages ?

The Old Testament was written in the Hebrew, and the New Testament in Greek. These two are the whole Bible. The books first written in Greek and in Latin are called the Classics. Languages only written are called Dead Languages ; those spoken, Living Languages.

Have we classical books in our English language?

Many of them are turned into English ; we say, they are Translated.

Why is the language of American people called English ?

Because the first white men who came to this country, now called the United States of America, spoke the English language ; they worshipped God in English, and had their laws written in it.

Are there no residents in these States but those who speak English ?

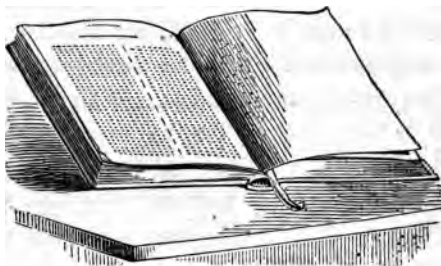
There are many Germans, Frenchmen, and people from other European countries ; but our books are in the English language, and it is the language of our nation, and of our laws. ~~4~~

Have people always had Paper ?

Paper made of linen rags has not been used more than five hundred years ; since the middle of the thirteenth century.

What was used instead of paper ?

Parchment was often used. Parchment is the skin of sheep or lambs, made thin, smooth, and a little stiff. But parchment was dear, and scarce ; few people had it.



Open Book.

How long have we had printed books ?

Only since 1444, about four hundred years.

Who invented Printing ?

Perhaps several persons invented it ; some persons say that John Faust, and others that John Guttenberg, both Germans, invented the art of printing.

Where was printing first practised ?

On the continent of Europe. Bibles were first printed in Paris.

Was there much call or demand for Books then ?

In the fifteenth century there were few people who could read or write, so that they had no great want of them.

What created demand for books ?

When books were printed, people, finding *they could have such as had been written be-*

fore, learned to read, and had their children taught to read.

Were there no schools before there were printed books ?

There were some schools, but all the books used in them were written out and cost a great deal. Some good people gave large sums of money to support these schools, and some children attended them.

How is a book made ?

The Author or contriver of the book thinks what he wishes to have printed, writes it out, sends this writing to the printer, who puts it all in leaden letters or Types, and prints it out on paper.

Is that all which is done to the book ?

The printed sheets are sent to the binder, and the leaves are then folded ; it is next pressed in a frame ; then covered, and sent to the bookseller to be sold.

What is a printing-press ?

A machine that presses sheets of paper upon types, which are smeared over with ink. The paper absorbs the ink, and we can read the pages.

What are pages ?

One side of a printed leaf. The Leaf of a book is so called because long ago people made

letters on the leaves of the Palm-tree. Some people in Asia write on leaves now.

Is nothing printed but books ?

Newspapers and handbills. Newspapers, sometimes called Gazettes, were first printed in England in the sixteenth century, and also in France, but not every day as at the present time. The newspaper is now to be found in almost every house.

Who first introduced printing into England ?

William Caxton began printing in England in 1471 ; he learned the art in Germany.

Is paper useful in many ways ?

Paper serves many uses. What we call Waste paper is one use ; it is much used for Envelopes, or to wrap up light things in ; then there is painted paper that we put upon walls, and Writing paper.

Are there no other kinds ?

There is thick paper of which light boxes are made, and Papier Maché. This last is many sheets together pressed tight, made smooth, painted and varnished. Port-folios, and very pretty boxes, are made of Papier Maché.

From what is the name Paper taken ?

From Papyrus, a reed growing in Egypt. *The inside of the reed is soft and white, and*

strips of it laid or woven together, being pressed and dried, made a kind of paper which was once more used than parchment.

Was Bark ever used as paper?

The inner bark of the beech, and of the linden-tree, will make a poor kind of paper, once used in Europe for want of something better.

What is supposed to have been the most ancient mode of writing?

On tablets of stone, metal, or wood. Tablets or tables are like slates, larger or smaller. The letters were cut or graven on stone and metal.

What was engraved on tables of Stone?

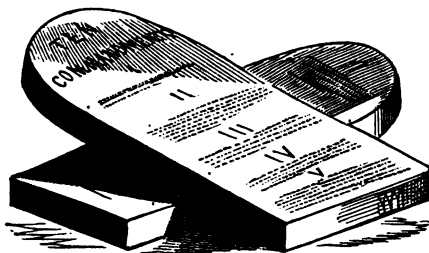
The Ten Commandments or Decalogue found in Exodus, chapter xx. God gave these to Moses for the Hebrew people, and for all people everywhere.

When did Moses receive the Commandments?

About fifteen centuries before Christ came.

Did Moses know letters?

Moses must have learned to read in Egypt, where he was bred up. The Egyptians could write and read, and so could the Hebrews, else God would not have given them a law *to be read*.



Tables of the Commandments.

Did the Greeks engrave on stone ?

They did so. There are marbles now in England, brought from Greece, which are engraved with letters.

Did the Romans engrave on metals ?

The Romans had some famous laws which they sent to Greece for, and these, called the "Laws of the Twelve Tables," were engraved on tablets of brass.

Could the people read these tablets ?

They were set up in a public place that all who could might read them, and others who could not might hear them read.

How were Greek and Roman children taught to write ?

A tablet of wood was given them covered *thinly* over with wax. Besides this, the

learner had a little roller and an iron pin, called a Stylus.

What did he with these ?

The writer made letters on the soft wax, and when they were not well made, he rolled down the wax smooth with his roller, and so made the letters over again until they were well done.

When did Pens and Ink come into fashion ?

Whenever Papyrus, paper, and parchment came into use. The first pens were Reeds.

Had the ancients great Libraries ?

Very few persons had such in private houses, but at Alexandria in Egypt, and at Pergamos in Asia, great libraries were collected.

What is a Library ?

It is a collection of books, more or less in number.

What are some of the largest Libraries in Europe ?

The Vatican Library in Rome ; the Royal Library in Paris ; the Bodleian in Oxford ; and the Library of the British Museum in London.

Are there great libraries in other cities ?

Berlin, Petersburg, Vienna, Copenhagen, and all large towns in Europe contain public

libraries to which persons desiring information are allowed access.

Have we considerable libraries in the United States ?

We have none so large as those of Europe, but some containing thousands of volumes in all written languages.

Where are these libraries ?

They are, principally, the University Library of Cambridge, Massachusetts; the Philadelphia Library; the New York Society Library, and the Astor Library, also in New York.

What is the meaning of the word Scripture ?

Scripture properly means a Writing, but has long been used to signify the Old and New Testament or Bible, commonly called "The Scriptures."

What is the meaning of the word Scribe ?

Scribe, in the Gospel, means men learned in the Scriptures and laws of the people; men who explained their law to the Jews.

Is there no other meaning for Scribe ?

Scribe was also a person who wrote out and copied books before printing was practised. The room used for this purpose was called a Scriptorium.



A roll or volume.

What are reeds ?

The Reed is a tall, grass-like plant that grows on the borders of rivers and brooks. The reed is hollow, and when full grown becomes stiff and dry.

How was it made into pens ?

The reed was cut into proper length for pens ; then it was sharpened and slit like a quill pen. Turks; Moors, and Asiatics still write with the reed.

What are Quills ?

The long wing feathers of birds. The quills commonly used for making pens are chiefly those of the goose, which are prepared on purpose.

Is there no other sort of pen ?

Quills are not much used now, but pens of gold or of steel are used instead. Steel pens are made in vast quantities in Birmingham, England.

What is the meaning of the word Volume ?

Volume, or Volumen, means a roll. In ancient times a book written out was rolled up like a map, and unrolled for convenience of the reader.

Is there no printing but that of words and letters ?

There is printing of pictures, calico printing, and lithographic printing.

What is picture printing ?

This is often called Engraving, and the pictures so printed are Prints. These are often very beautiful.

Can you describe engraving ?

The figure of birds, men, flowers, trees, or any object, is cut in strong lines on wooden blocks or copper or steel plates ; the lines are filled with ink, paper is pressed on them, and the paper takes off in ink the engraved picture.

What is Lithography ?

A cheap mode of engraving by means of blocks of stone.

Is Printers' ink like writing ink ?

Not exactly ; it is a thicker substance, and

will not run through paper, so that both sides of a sheet may be printed. #



Are all things which are around us of the same thickness and hardness?

Some substances are harder and some are softer and thinner than others.

What is a hard substance?

One that I cannot press my finger into, as iron or wood. A soft substance is one that I can make an impression upon, as on butter, in summer.

What are your Faculties?

Powers that I can use. I have the faculty of sight, and that of hearing. My Senses are Faculties.

What are your senses?

Seeing, Hearing, Smelling, Tasting, and Feeling; by means of these I perceive all that I know, and I understand by means of my Intelligence, that is, by my intellect or understanding.

Has the marble image of a child any intelligence?

None, because it is only a material thing; it cannot perceive or know any thing for want of *Intellect*.

What is Matter ?

We call that Matter which cannot feel, know, or think.

Do we know nothing but about matter ?

We are acquainted with Spirit and Matter. That which feels and knows something, and that which neither knows nor feels.

Are all things Solid ?

All things are solid, fluid, or gaseous ; a block of stone is solid, and so is ice ; but water and vinegar are fluids, and the air we breathe is gaseous.

How do you describe the difference ?

A Solid may be lifted from place to place in one mass or piece, but will not pour along in a stream like fluid water ; and a gas is so fine that it can only be felt, not seen, as I feel wind blow, or smell gas from burning coal.

What is Density ?

The consistence of things ; wood is more dense than soft soap, soap than molasses, molasses than milk, milk than water, and fluid water than steam ; steam is water made warm, and dispersed in the atmosphere.

What is Evaporation ?

When a pan of water is set in the air, the water rises in Vapor into the air, and leaves the pan quite dry.

What are Particles and Atoms ?

Very fine portions of any substance, like grains of sand, or of flour ; each particle is sand or meal as much as the whole quantity.

Can heavy solid substances become particles ?

By grinding them to dust they may.

What are Pores ?

Little holes often too fine to be seen with the naked eye, which exist in all solid substances. The pores of sponge are easily seen ; they suck up or absorb water when the sponge is thrown into it.

Do pores make things lighter to lift ?

The more and the larger pores are in any substance, the more light it is. Pine wood contains larger and lighter pores than hickory wood, and hickory is therefore the heavier.

What is Melting ?

Melting, or fusion, is the change from solid to fluid by means of heat. If I put a piece of ice into some warm water, or set the ice in a warm place, the solid ice will be turned to fluid water ; it will be liquefied.

If you put a lump of sugar into water what will become of it ?

The sugar will melt in the water, and the particles of sugar will be mixed with particles of water. The sugar will be Dissolved in water ; *it will be held in solution.*

Can you get your sugar again ?

If I set it in the sun the water will evaporate, and the sugar will be left in small crystals.

What are Crystals ?

Whatever substance is first melted and then made solid, takes, in the solid form, shapes of its own, called Crystals. The crystals of salt are not shaped like those of sugar.

Did you ever see crystals of water ?

Water when it is freezing forms crystals ; they look at first like needles of ice. This is the Crystallization of water.



What is Tea ?

Tea is the leaves of a plant which is cultivated in China, and is said to grow also in Japan and in Siam. We drink an extract from these tea leaves. Boiling water is poured on them, which draws out the flavor or taste of the tea. Tea is usually, but not always, drunk with the addition of milk and sugar.

Is tea all of one quality ?

No ; Teas are divided into Green and Black, and these into better or poorer sorts ; the better kinds being more costly than the poorer.

Who uses Tea ?

These different kinds of tea are used all



Tea Plant.

over the United States, over great part of Europe and Asia, and in the European colonies. The rich and the poor alike have learned to consider tea a necessary article.

Has tea always been used in Europe ?

Tea is supposed to have been brought into Holland from the East, by a Dutch merchant. An English gentleman drank some in London not quite two hundred years ago, in 1661, but people in general knew nothing of it.

Who first imported much tea to England ?

A company of English merchants called the East India Company, in 1678 imported several thousand pounds of tea. From that time greater quantities were brought into that island, and at length all people could obtain it.

Vast quantities from that time have been imported from Canton, in China.

Do all qualities of tea grow on one plant ?

That is not known. The Chinese do not allow strangers to visit their plantations. It is supposed that leaves plucked at different times make different sorts of tea. Some tea consists of very coarse leaves and stalks.

Who drinks such tea ?

Very poor people, especially the Tartars. Tea of this quality is pressed into little blocks, and is called Brick tea. The Tartars on long journeys boil a lump of this tea which makes bad water less disagreeable to drink.

How is the tea-plant cultivated ?

By sowing the seeds at proper distances, and keeping the young plants clear of weeds. In three years they afford their first crop of leaves.

Do they continue to grow ?

These plants increase in size for several years, from seven to ten ; they are then cut down, and new shoots springing from the roots produce new crops of leaves, or tea.

How is the tea made fit to drink ?

By drying the leaves in pans over furnaces, *and then* rolling them up by hand. *Afterwards the tea is* packed and sold.

Could not we in this country produce tea?

Perhaps it might be done in the Southern States, but labor is too high in the United States for the cultivation of tea.

What is the price of labor?

Wages, or money, paid to those who work for others. The Chinese will work for less wages than men in the United States, and the cultivator and the merchant can afford to sell the tea for less money than Americans could sell it for.

What is Sugar?

A sweet substance made of the juice of several vegetable products, as the Saccharum, or sugar-cane, the beet-root, and the sugar-maple tree of the United States. The honey extracted from flowers contains sugar.

Was sugar always known in Europe?

No; sugar-cane was brought from Western Asia into Sicily. In 1403 the Portuguese planted it in the island of Madeira, and about one century later, the Spaniards sent it to the West-India islands. There it has been cultivated by negroes during three hundred years.

Which of the islands produces the largest quantity of sugar?

Cuba, still a Spanish island, and the largest



Sugar-cane.

of those islands. The State of Louisiana produces much sugar by the labor of slaves.

What sort of a plant is the sugar-cane ?

It belongs to the graminæ, or grasses, but is much larger than maize or Indian corn, having a tall stem as thick as a man's arm ; from this the sugar is obtained.

How is sugar made ?

The canes at a proper time are cut down and carried to a mill. Being there crushed between rollers, the juice runs out and flows into a receiver ; it is conducted to a boiler, and after being boiled several times it Crystallizes.

What is Crystallization ?

The change of a fluid into a solid form.

Water frozen into ice is crystallized. The separate particles of brown sugar are crystals.

Is there no other substance contained in new sugar?

Yes, the sweet substance called Molasses, which is drained from the sugar.

What alters sugar from brown to white?

A process called Refining. This is done by pouring melted sugar through vessels full of holes in the bottom. A cloth is laid upon the bottom of this vessel; then some charcoal made of burnt bones is spread over the cloth, and the melted sugar is strained through.

In what state is the sugar after this process?

When cooled, it has become white; the brown color has entered into the charcoal, and the sugar is fit to be used.

Is there other sugar besides that of the cane?

There are Beet-sugar and Maple-sugar. Beet-sugar is made and used in France. Maple-sugar is made in the Middle States of this Union from the sap of the maple-tree. It may be refined so as to become quite white.

How is the sap procured? X

The tree is bored, and a hollow stick or tube of wood is inserted in it; the sap flows into the tube, running out at the end and falling into a vessel set to receive it. When a certain

quantity has been collected from many trees, the sap is boiled to sugar.

At what time of the year is this done ?

In frosty weather. The sugar season lasts from February to April.

What can be obtained from molasses ?

By distilling it, Rum is obtained. This is an intoxicating liquor ; but the alcohol contained in rum is good for many uses. All vegetable substances which contain sugar will afford Alcohol.

What is a common use of Alcohol ?

It is burned in spirit-lamps to heat water and other things, because it makes no smoke in combustion.

What is Combustion ?

Combustion is what we call "burning up" a substance. Combustion changes wood to smoke and ashes. Some substances are Combustible, as paper and cotton ; and some are Incombustible, as iron, clay, and bricks.

#

What is Coffee ?

Coffee is the seed of a shrub ; it is brought to this country from Arabia, Java, Brazil, *Surinam*, and the West Indies. It is contained

in a berry having two seeds with the flat sides facing each other.

Is coffee indigenous to Arabia?

It is supposed to have been brought there from the neighboring country of Abyssinia. Abyssinia is said to produce as good coffee as the Mocha or Arabian.

How is coffee prepared for use?

It is roasted and then ground to powder. The flavor is obtained from it by boiling water, and the liquid coffee, with the addition of milk and sugar, is taken at breakfast and at other times. ✕

Is coffee much used?

It is very extensively used in Europe and in the United States. In France and in Turkey there are houses or rooms where coffee ready prepared is always sold; these are Coffee-Houses; in the French language, Café.

Do the people of our country consume much coffee?

A vast quantity; not less than 90,000 tons of coffee were imported into the United States in 1851.

When was coffee first used in Western Europe?

About one hundred and fifty years ago, (1700), Governor Van Horne, a Dutch gentleman, procured seed from Mocha, and reared

coffee-plants in Java; of these he sent one to the botanical garden in Amsterdam.

Of what service was this coffee-plant?

The seeds of this plant were sent to the warm country of Surinam, a Dutch colony of South America, and from those seeds all the coffee of that part of the world has been produced.

Will coffee grow in cold climates?

No, it requires a warm country; our summers are not long enough to ripen the coffee seeds, and our long cold winters would kill the roots.

Is the coffee shrub perennial?

A perennial plant lives many years; Coffee plants begin to produce at two years and a half old, but those of five years afford the best coffee. //

What is Cocoa, sometimes spelled Cacao?

It is the seeds of an evergreen tree, indigenous to South America, but also cultivated in the West Indies and in Southern Asia. The seeds, about twenty-five in number, are contained in pods.

How is cocoa generally used?

It is manufactured in different ways. Pure

cocoa, the shells having been taken off, is often ground to powder, and after boiling is used with milk and sugar like tea and coffee.

What is Chocolate ?

It is a preparation of cocoa, made into a paste, sometimes containing sugar, and shaped in a mould ; it then becomes hard and dry, and is sold in cakes.

What are Condiments ?

Substances added to ordinary food to give it a higher flavor, as salt, pepper, and mustard.

What are Spices ?

Aromatic, or sweet-smelling substances, also added to food to heighten its flavor, as Nutmeg and Cinnamon.

What is Table-salt ?

A substance found in springs, mines, and in sea-water. At Salina, near the town of Syracuse, in the State of New York, there are springs of water containing great quantities of Salt. This water, drawn out and evaporated, leaves the salt, which is refined and sold.

How is sea-salt procured ?

By drawing up sea-water into broad shallow

troughs, and evaporating it, as is done with the water of brine-springs.

Where are there salt mines ? •

There are some both in Poland and in England ; the former are near Cracow, and belong to the emperor of Austria. These mines are so vast that arches and streets have been dug out of the salt, and they are inhabited by laborers.

Where are the salt-mines of England ?

In the western part of the island, chiefly at Nantwich, in Cheshire.

Is salt a necessary of life ?

It appears to be so ; the greater part of our food is made more palatable, more agreeable to the taste, by the addition of a certain portion of salt. Salt is found in all countries, but is not everywhere very abundant.

Do brute creatures relish salt ?

They do. Salt-licks, or waters containing salt, attract wild animals, the buffalo and others, in the Western States. Domestic cattle, sheep, oxen and cows, like salt in the dry fodder they live on in winter.

* Is salt useful to preserve any thing ?

Yes, for preserving beef, fish, and other animal food, so that it can be kept wholesome

for months ; if it were not for the application of salt, these articles would spoil, or Putrefy.

What is Putrefaction ? •

It is a change which happens to animal substances that makes them offensive and hurtful. In this state they soon fall apart, and return to dust ; that is, to the earth.

What is Decomposition ?

Putrefaction is sometimes called Decomposition. To Compose is to unite, or to mingle different substances together ; to Decompose is to take them apart.

What is Pepper ?

The dried berry of a creeping plant growing in Malacca and other places in that vicinity. The berries hang in clusters like a bunch of currants. Pepper is hot or Pungent.

What is Mustard ?

It is the crushed seed of a plant which flourishes both in England and in the United States, and which grows wild in some places.

What is Allspice ?

It is the fruit of the pimento-tree, which grows in Jamaica and in other West India Islands. It is called Allspice because it is *said to have the flavor of many spices.*

What is Nutmeg ?

It is the fruit of a tree found in the East Indies. The nutmeg grows like our common nuts, and is contained in an envelope like them.

What is Mace ?

It is a sort of lining to the nutmeg husk, and is very aromatic.

What is Cinnamon ?

The under bark of a tree which grows in Ceylon and in some other islands. Cinnamon is ground and used in powder, or is boiled in milk to flavor custards.

What are Cloves ?

Cloves are the flower-buds of an East Indian tree, and are used in soups and other articles of high-seasoned food.

What are Caraway and Coriander Seeds ?

They are seeds used mostly by druggists and confectioners, to flavor medicines and cakes. These seeds are produced in England.

What is Ginger ?

The dried root of a reed-like plant. It is found in hot countries, and makes an agreeable preserve.

What is Turmeric ?

A vegetable substance of a bright yellow

color used in dyeing, and also in Curry. Curry is a powder used by some persons in cooking meat.

What is Licorice ?

Licorice grows in England and is used as medicine. The stalks when dried are very sweet, and the juice can be boiled to considerable solidity.

What is Saffron ?

It is a yellow flower from an herb growing in England and the United States. It is used in dyeing.

What is Betel-nut ?

A nut which is not known in these States ; it grows on a tall palm-tree, and all palms are the growth of hot countries. Some of the Asiatics chew slices of betel-nut, as some men among us chew tobacco, until it blackens their teeth.

Is this a good habit ?

It is not ; this chewing is not taking food, and often makes a person disagreeable to others.

What is Wine ?

It is the juice of Grapes fermented and made clear. Besides grapes, other fruits will

make wine, as Elder-wine, Gooseberry-wine, and Currant-wine. †



Grape-vine.

Will Apples make wine ?

The juice of crushed apples is Cider ; this might be called Apple-wine. Cider and all wines become sour, and make vinegar.

Do the Scriptures mention wine ?

Frequently ; Psalm civ. says that the Lord gives " wine that maketh glad the face of man," and Christ turned water to wine at the wedding feast in Cana of Galilee for the use of the guests assembled on that occasion.

Does the Bible recommend the use of wine ?

King Solomon in his book of Proverbs recommends that men should " look not on the

wine-cup," for "at last it biteth like a serpent and stingeth like an adder."

What does that mean ?

- It means that excessive use of wine will make a man miserable, and therefore if he desires to drink much, it were best he should not even look at the wine-cup.

Where does wine come from ?

There are many kinds of wine : Port comes from Portugal, Sherry is made in Spain, Claret and Champagne from France, Madeira from the island of Madeira, and what are called Rhine wines from Germany.

Do the French drink much wine ?

The French use Claret, or what are called "light wines," for common drink. Such wine is not strong, and will not intoxicate if not used extravagantly.

Will Grapes grow in cold countries ?

In such countries they will not grow to perfection in the open air ; but in temperate climates, as in France, Spain, and Italy, the grape-vine flourishes. In Italy grape-vines are trained from one tree to another.

How are Grapes cultivated ?

In a field called the Vineyard. The season of gathering grapes is the Vintage. A Vineyard looks not unlike a bean-field, the vines

being kept small, and trained upon sticks not above eight feet in height. During the vintage the laborers employed in it are very busy and very gay.

Is wine made in this country ?

Some wine is made in the State of Ohio, near Cincinnati.

What is Brandy ?

It is a strong intoxicating spirit obtained by distilling wine, and sometimes fruits ; there is Apple-brandy. Brandy is imported from France to this country. Gin, Whiskey, and Rum are also intoxicating spirits, prepared in different ways.

What is Honey ?

A sweet substance sucked from the nectary of flowers by bees, and deposited by them in hives or in hollow trees.

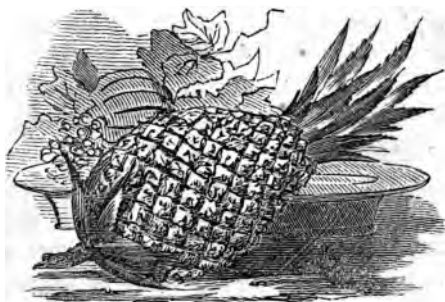
Does honey afford any intoxicating drink ?

It may be mixed with water and fermented so as to make a wine called Mead or Metheglin. In Germany and in the northern countries of Europe much metheglin was formerly made and consumed.

What foreign fruits do we import ?

Oranges, Lemons, Limes, Shaddocks, Pine-apples, and Bananas ; besides Almonds, Cocoa-

nuts, Dates, Citron, Raisins, Prunes, dried Currants, Figs, Pomegranates, and Tamarinds.



Pineapple.

Where do our best Oranges come from ?

They come from Cuba, and are called Havana oranges. We also have oranges from Sicily. The best oranges known in England are produced in St. Michael's, one of the Azores—islands west of Spain.

Do lemons resemble oranges ?

Oranges are sweet, generally, while lemons are Acid, or sour. Limes are also sour ; they are of a greenish color, are round, and smaller than lemons.

What is the use of Lemons and Limes ?

Lemons are often grated for the skin, or *peel*, and *this peel* is used to flavor different

articles of food. Lemon-juice, squeezed out, or expressed, is often mixed with water and sugar; this agreeable drink is called Lemonade. Lemons afford a salt called Salts of Lemon, which is very acid, and will remove stains from linen. Lime-juice is used in the same way. Limes grow in Spain, Portugal, and Egypt.

What is Citron?

Citron belongs to the same family of trees as the orange and lemon, but the fruit is different from those, being remarkable for a thick spongy rind, which, when in the Natural state, is very fragrant. It is often preserved.

What is the natural state of fruit?

The natural state of a fruit is that in which it grows when first taken from the tree, without any cooking. The citron we use is the preserved rind, which, cut in slices, is put into puddings and cakes.

What is Sherbet?

A beverage much like lemonade, made of any fruit, especially limes. In hot countries, in Turkey, in Persia, and in Egypt, the inhabitants drink Sherbet. Shaddocks somewhat resemble an orange, but they are larger, have rather a bitter flavor, and a thick tough *skin*.

Where do Pineapples abound ?

They are native in Africa and South America, and are brought to the United States from the West Indies. They grow without trunk or stalk directly from the root.

Will pineapples grow in England or the United States ?

Pineapples in these countries may be made to grow under glass in pots, or in a Hot-house, that is, a house of glass, within which the sun produces a much greater heat than in the open air.

What are Bananas ?

They are the fruit of a tree which grows in hot countries. The fruit grows in bunches, or clusters, and looks like small smooth cucumbers. The skin being drawn off, within is found a soft fruit as juicy as the pineapple, which is much liked for its flavor.

What are Almonds ?

Almonds look somewhat like a peach-stone or Pip (not *pit*), but the shell is brittle and may be broken by the fingers. The kernel is covered with a rough skin, not well-flavored. When this is removed, the pure white almond is very palatable.

In what countries do almond-trees grow ?

In France, Spain, Italy, and Western Asia. The almond is often pounded with sugar, and

put into cakes and confectionery. Pressed almonds afford oil which is used in medicine.

What is a Cocoa-nut?

An oval nut, sometimes measuring twenty inches round, though it is generally less. The kernel, which is of a pure white, lines the shell, and at the bottom, as in a cup, is contained the sweet juice often called cocoa-nut milk.

What sort of tree is the Cocoa-nut?

It belongs to the family of Palms. These all grow in a tall shaft, or trunk, like a tall cane, bearing their fruit and a tuft of leaves in the top. This column of the cocoa-nut tree often rises to the height of sixty or ninety feet. It produces leaves and fruit long before it reaches this height, so that the head of the tree constantly pushes up from the trunk.

Are marks of this growth left on the tree?

Yes; wherever leaves have been, two rings are formed round the tree; thus for every two rings one year of the tree's age is counted. It bears about a dozen or fifteen leaves from twelve to fourteen feet long on its summit. These look like plumes, and have been compared to Ostrich feathers.

Where do the nuts grow?

Among the leaves. In wet seasons this tree

blossoms every six weeks, so that flowers and ripe nuts may be seen on the tree at the same time, from five to fifteen nuts in a bunch. A good tree will produce one hundred in a year.

Are the leaves useful?

They are very useful: they serve to thatch or cover the roofs of cottages, to make baskets, and even to write upon with the pointed instrument called a Stylus. Poor people in Ceylon and Brazil feed almost entirely on the cocoa-nut.

Of what other use is this tree?

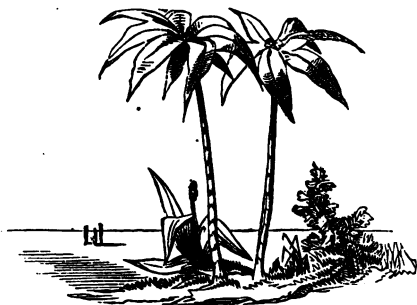
The shell of the nut serves for measures and drinking vessels; the fibres from the husk make ropes, and polish furniture; the kernel affords oil that is burned in torches; the wood can be used for posts, beams, and fences, and its ashes afford much Potash. This tree is one of the most useful known.

Where does the cocoa-nut abound?

It grows near the sea, in Brazil, Ceylon, and in all Tropical Islands.

What are Dates?

A fruit in appearance a little resembling a plum, but it is more solid and less juicy when brought to this country in boxes or bags of matting, pressed into a mass. Palm-trees are of *many sorts, or varieties*.



Palm-Trees.

Has the Palm-tree any resemblance to the Cocoa-nut tree ?

They are alike in their general structure, or form, but their fruit is quite different, except that they are both very nutritious, or nourishing, and both afford sustenance to great numbers of people.

Where is the date-bearing palm very abundant ?

In Egypt and on the African coast of the Mediterranean.. Palms grow in Palestine. The Gospel relates that when our Lord entered Jerusalem, not long before the Crucifixion, the people strewed branches of trees in the way in honor of him. These are supposed to have been palm branches.

Who celebrate this event ?

Catholic Christians make a religious pro-

cession in Italy on Palm Sunday, which is the Sunday before Easter ; and having palm-branches procured from abroad, strew them in the streets.

What are Raisins ?

Raisins are dried grapes, brought to the United States from the best grape-bearing parts of Europe. Some of the best come from Malaga, in Spain.

What are Prunes ?

They are dried plums exported from France ; when stewed, prunes are very wholesome.

What are Currants ?

We use two sorts of Currants, one cultivated in our own gardens, and the other, dried black Currants imported from Zante, one of the Ionian Islands. The last are a small stoneless grape, which is put into cakes and puddings.

What are Figs ?

Figs are the soft sweet fruit of the Fig-tree ; they grow in all warm countries. The dried figs sold in this country are chiefly brought from Smyrna ; some come from Spain and Italy. They are brought to us in round wooden boxes called *Drums*.

Are Figs mentioned in the Bible?

Many times, both in the Old and the New Testament, which shows that they grew in Palestine, the country of the Bible.

What are Pomegranates?

They are shaped like an apple, and are full of seeds, to each of which is attached a sweet pulp, which is eaten. The flower is of a rich crimson color, and may be seen in this country, sometimes in Conservatories, and sometimes in the open air.

Of what country is the Pomegranate a native

It is found in Africa, and also in the East.

What do you understand by the East?

The countries of Western Asia, even to Persia; countries further east we call the Indies and China.

What is a Conservatory?

A convenient building formed chiefly of glass, but not heated, intended for the preservation of exotic plants in cold weather.

What are Tamarinds?

A tropical fruit, consisting of flat smooth stones in a long pod; with the addition of syrup they afford an agreeable drink, often used by the sick.

What are the fruits of the Northern and Middle States ?

They are apples, pears, grapes, cherries, strawberries, chestnuts, hazel-nuts, peaches, plums, apricots, quinces, and various native berries.

What are the best Apples in the United States ?

Those called Newtown Pippins. They will remain sound during winter, and some of them are sent to Europe for sale. A piece of land containing fruit trees in regular rows is an orchard. Pears, first brought to this country from France, are extensively cultivated.

Are Pear-seeds sown to obtain pear-trees ?

The nursery-man produces many little trees in this way ; these afterwards are transplanted to other grounds, but it is uncertain what quality of fruit will grow from such trees.

How then is good fruit obtained ?

By a process called Engrafting. If a person desires that his young trees should produce apples, pears, or any fruit of some particular species, he seeks a tree of that sort in a proper season, and cuts off certain buds attached to a part of the stem on which it grows ; he then inserts this graft into the stem of a young tree, called *the Stock*.

How is this done ?

He makes a little slit in the inner bark of his stock, and bringing his graft to a point, smoothing one side of it, he pushes it into the slit. He next surrounds the graft and the stem containing it with a paste of clay, which he leaves about them. In a few months the scion or graft joins itself to the tree and pushes out leaves.

Do the stock and the graft grow together ?

The stock is afterwards cut away, and the graft grows to be a tree of the sort whence it was taken, affording fruit like that of the parent tree.

Have we native grapes ?

We have wild grapes, which, being cultivated, improve much in size and flavor.

Have we any wild or native Cherry-trees ?

We have, but the cherries are chiefly used to put into brandy, thus making a drink called Cherry-brandy. The bark of the wild cherry, when ground up, affords an extract used as medicine.

For what is this extract given ?

Weak people take it as a Tonic, a medicine to increase strength. Wild cherry-tree wood *is used by the Cabinet-maker.*

Where were our best Cherries brought from ?

This fruit is said to have been introduced into Europe from Cerasus, in Asia Minor, on the borders of the Black Sea, and from there brought to this country.

Are Strawberries indigenous in these States ?

Yes, they are found wild in the fields and woods, but are brought to greater perfection in the garden. There are many varieties of strawberries.

Have we Chestnuts and other nuts ?

We have chestnuts and other kinds of nuts. Our chestnut is not half the size of those of Spain and France, which are sweet, and when roasted, very palatable. All chestnuts are inclosed in a very prickly husk, which falls off when they are ripe. The Italians make meal of chestnuts, which, when cooked, they call Polenta.

Does the chestnut-tree grow to great size ?

It does, and also lives for centuries. The Horse-chestnut is what we call a "shade-tree," and is much planted in the streets of towns, and as ornamental to houses. Its nut is bitter, and not fit to be eaten.

What are Hazel-nuts ?

A small fruit resembling the Filbert. The *hazel-nut* is round, twice the size of a large

pea ; it grows on a tall thick bush, and has a hard shell. The Filbert, resembling it in flavor, is considerably larger, and is imported from France.

How do Shell-barks and other native nuts grow ?

Upon tall trees. The wood of nut trees is valuable ; Hickory wood, sometimes burnt as fuel in houses, is very strong, and serves many uses ; that of the Black Walnut is of a dark color, and is made into furniture.

Are Plums plentiful in this country ?

They are, both of the wild species and from engrafted trees. They are a stone fruit, eaten fresh or preserved, and are much cultivated in Europe and the United States.

Have we Peaches ?

Peaches grow in great quantities, and we have also Apricots and Nectarines. Apricots and nectarines partake of the nature of the peach and plum, and are both stone-fruits of delicious flavor.

Where have these fruit-trees come from ?

They, like the cherry, were carried from Western Asia to Europe, and then exported to the United States ; here they reward the cultivator by bringing a high price in large towns.

What are Quinces ?

They are a foreign tree, but naturalized here. The quince-tree is so small as sometimes to be called a bush. Pears, peaches, and apples may be engrafted on quince stocks, but the trees thus treated grow no larger than the Quince-bush. They are called Dwarf trees, as human beings of diminutive stature are called Dwarfs.

What are our native berries ?

Gooseberries, Raspberries, Blackberries, and Whortleberries, are those chiefly eaten. These may be preserved in sugar, like the quince, which is only so used.

What are Capers ?

The flower-bud of a creeping shrub which grows in Italy and the south of France, and also in the island of Majorca. Capers are preserved in salt and water with a little vinegar. They are exported to different countries, and eaten with boiled mutton.

From whence have we Olives ?

Olives are imported from France, Spain, and Italy. Olives, a stone-fruit of a peculiar green color, thence called olive-green, are pickled in salt and water, and much liked by some persons. The olive affords the oil which is called *Sweet Oil*; that is eaten upon salads.

Has the olive-tree any character ?

Its branches are called the Emblem of Peace, because when Noah sent a Dove out of the ark, she returned to him with an olive branch in her bill. This assured the Patriarch that the waters of the Deluge had subsided, and that the trees were vegetating, so that he and his family might go forth upon the earth.

How is the Dove an emblem of Peace ?

An emblem is a sign of something not expressed in written or spoken words. The dove could not speak, but she brought the Olive branch. Noah, seeing her with it, thought, There is peace now on earth. The rain and storms have ceased, and God has revived all things, that I and my children may enjoy them. Thus were the Dove and the Olive-branch emblems.

When did this happen ?

About 1656 years after the creation of the world.

How do we light our houses at night ?

We light them with candles and lamps. Candles are made of wax, of spermaceti, and of tallow; and lamps are fed with lard oil or whale oil, and with Camphene.

What are these different substances ?

Wax is a vegetable product obtained by bees from flowers. The honey is deposited by them in cells called Honeycomb, made by the bees for the reception of honey in the hive. Wax is also made by bees of honey, which they change into wax; it is naturally of a yellow color.

Can that color be removed ?

Yes, by a process called bleaching. The wax is melted and spread into thin sheets; these laid for some days in the sun become beautifully white, and can be made into purely white candles.

What is Spermaceti ?

It is a fat substance found in the head of a Whale. The whale is the largest fish known; he is found in the Pacific Ocean, also in the Arctic, and sometimes approaches our own coast.

How is the whale taken ?

By persons known as Whalers, who go out in search of him. These adventurers are sometimes three or four years away from home before they get oil enough to make a Good Voyage?

What is a good voyage ?

That in which the whalers get so much

sperm and oil as will sell for money enough to pay the captain and his men, that is, the crew, and the ship-owner besides, for all that has been spent to fit out the ship for sea, keep the men, and to give all these some money, over and above all that was laid out. This last is the Profit.

Are Spermaceti and Oil the same substance ?

No ; when a whale is taken, the head of the whale, often twenty feet in length, is found to contain both Spermaceti and oil. They can be separated ; one of these substances, when purified, makes Spermaceti, and the other oil. One is made into candles, the other burned in lamps.

Is Spermaceti useful for other purposes ?

Yes ; it is mixed with other matter in salves and cerates, and applied to sores which are healing.

What is Lard Oil ?

The fat of swine melted ; this oil gives a good light in burning, and is useful where whale oil is not easily procured. Tallow is the fat of beef and mutton. It makes common candles.

Can you describe a Candle ?

A candle is a Cylinder of wax, spermaceti, or tallow ; it is generally formed in a mould.

The wick is a string of twisted or braided cotton yarn fastened to the top and bottom of the mould. The wax or tallow, when melted, poured into the mould, takes the shape of it, and incloses the wick. ✕

When will the candle burn ?

When the wick is set on fire ; the burning of it melts the wax or sperm, and both, burning together, will afford light.

Which gives the greater portion of light, a lamp or a candle ?

A lamp of a certain construction, the wick surrounding a cylinder, will give out as much light as ten spermaceti candles weighing six to one pound ; but in order to do this, the lamp burns out more oil. A common lamp gives no more light than a candle.

What is the Gas used in lighting houses ?

It is obtained by burning bituminous coal, and is conveyed from the reservoirs where it is made, along the street, through pipes under ground, and from these pipes through lamp-posts, and into houses. ✕

What are the properties of this gas ?

This gas has a bad odor, and is unwholesome to respire, but it is very inflammable, blazes when kindled, and gives a brilliant light ; for that reason it is used in stores.

houses, churches, and other public buildings.

What is Camphene ?

Camphene is a mixture of alcohol and Spirits of Turpentine. It is fluid, and is much used in lamps ; but it is not safe to use it. The Camphene will take fire spontaneously in a very warm room, or near a heated stove. In that case it Explodes, or bursts the lamp, is spilt around, blazes up, and burns every thing near it. Thus many persons have been burnt to death.

What is Spontaneous Combustion ?

It is taking fire, blazing and burning, from the heat within a substance, or from the air, without the contact of any fire, or kindling. Hay in a barn will sometimes ignite in this way.

Does a candle burn Spontaneously ?

No ; it would never burn unless fire were communicated to it : we must Ignite, or set fire to it, by some flame applied to the wick.

What are Lucifer Matches ?

They are little slivers of Pine wood tipped with Phosphorus mixed with Gum or Glue. The points of the matches are first dipped in sulphur, and then in this mixture. They are *afterwards* dried, and are ready for use.

How are they used ?

To light lamps and candles, and to kindle fires. Phosphorus is very combustible ; by friction, or rubbing, on a rough surface, the Match is made to blaze, and will communicate fire.

What is Phosphorus ?

It is a substance extracted from bones. One sixth part of dried bones is phosphorus. Pure phosphorus is a poison, and should be kept out of the air, or it will take fire.

Is there any other name for fire ?

Yes ; it is sometimes called Caloric. All things contain more or less caloric. When any substance does not feel hot to the Hand, we call the heat within it Latent Heat ; but when a substance is hot to the touch, its warmth is called Sensible Heat.

How do we heat our houses ?

By means of fuel burned in chimneys and furnaces, such as wood and coal. Sometimes water is heated, and the steam forced through small metallic pipes which are laid in different rooms, and the air of the rooms is heated by the pipes.

How does a Furnace warm a house ?

Cold air from without is let into a part of the furnace, and the ignited coal in it heats the air. The air thus heated passes upward into different openings in the walls, or the floors of the rooms, and warms the atmosphere of those rooms.

Is Wood much used as fuel ?

It is not so much used in this country as formerly, because Anthracite coal has taken the place of it, and Bituminous coal is used in some families.

Where are these coals found ?

They are dug out of the ground, and therefore are called Mineral coal. Anthracite is harder than bituminous coal ; the latter seems to melt as it burns, and makes more smoke. People often call it Soft coal. Both are very black.

Where is Anthracite obtained ?

It is brought in vast quantities from the State of Pennsylvania, which contains extensive mines or deposits of coal.

Where is Bituminous coal procured from ?

It is brought chiefly from Liverpool in England, having been conveyed to that port from the northern part of that country, where immense quantities exist ; but there is

bituminous coal in different parts of North America, though the mines are not much wrought.

What consumes great quantities of wood and coal?

Steam Engines. These are employed in various factories, and for giving speed to travelling cars, and steam-ships.

Do the lower animals use Fire?

No, the Creator has not given them Intelligence to manage it. The Proverb says, "Fire is a good servant, but a bad master." It requires discretion, or good judgment, to use so destructive an element.


Can you tell me some of the most important uses of Fire?

It keeps men comfortable in cold climates and cold seasons. It cooks our food, else it would be neither wholesome nor palatable; and without it we could not make any porcelain or pottery vessels, nor adapt metals to our service.

What should we be deprived of without Fire?

We could have no knives, nor any edge-tools; no needles, ploughshares, and no metal money, without fire employed in the manufacture of them. We could not exist ourselves, for without animal heat we should be *hard as stones, without life and feeling.*

If a man sets fire to a house by design, what is his crime ?

In the law-books it is called Arson. He who commits this crime is an Incendiary, and is punished by long imprisonment. The burning of many houses, either by accident or design, is a Conflagration. 

Of what substances is our Clothing composed ?

Of wool, cotton, flax, silk, leather, and fur.

What is Wool ?

The curled hair or covering of the sheep, a quadruped known in all civilized countries, and often mentioned in Scripture. The young of the sheep is called the Lamb, and is a very pretty and gentle creature.

Who are mentioned in the Bible as tending flocks ?

Jacob kept Laban's sheep, Moses kept his father-in-law's sheep in Midian, and King David, when a youth, kept his father's sheep. These great men were shepherds. David, in the Psalms, says, "The Lord is my Shepherd, I shall not want." The occupation of tending flocks is a Pastoral mode of life.

How is wool obtained from the sheep ?

In the warm season the sheep has too much wool on his back for his comfort, and the

owner, wanting the fleece, cuts it off. He has the sheep first washed clean in a brook or river, and waits until the wool is dried before it is sheared off.

What is then done with the wool?

It is picked over, or sorted; the finer being put together, and also the coarser. The former is sold at a higher price than the latter to the manufacturer, and some is spun in families to make into yarn, and to weave into cloth.

Is the new wool fit for use at first?

No, it must be oiled before it will run into yarn. Then it may be drawn out by proper machines into threads, finer or coarser, and afterwards woven. When the grease is washed out of the cloth, it is dyed if desirable, or left white.


What is manufactured of wool?

Stockings, broadcloth, blankets, shawls, flannels, and a thin article called muslin de laine, or muslin of wool, and another of coarse wool, Felt, which is contained in men's hats.

By what machine is Cloth woven?

Woollen yarn is woven into cloth by a machine called a Loom. The threads running lengthwise are the Warp, and the crossing threads are the Woof. The whole piece is the Web.

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Are these all the uses of Wool?

I cannot enumerate them all; but besides the articles I have mentioned, mattresses are made of wool; and some poor people in Europe and in Tartary wear garments made of the fleece itself; this is the sheepskin with the wool upon it.

Are there different sorts of Sheep?

Yes, there are many species. The Merino sheep of Spain, and the Saxony sheep afford the finest and most valuable wool. A species of African sheep has so large a tail that it may be put into a little cart to be carried about by the animal.

What plant is useful in the manufacture of woollen cloth?

Teasel. Whole fields of this plant are cultivated for the manufacturers. The flowers of teasel, when it is cut and dried, have scales, so rough that when the teasel is drawn over newly-woven cloth it raises a Nap upon it.

What is the Nap?

It is fibres of the wool raised on the surface of the cloth. That furry appearance which hides the threads in blankets is the Nap. This nap is afterwards made smooth.

What is Cotton?

A vegetable product so much resembling wool as sometimes to be called "Cotton-wool."

Cotton grows upon a shrub from three to fifteen feet high, according to the species, for there are several sorts of cotton; one kind is of a Nankin color, and others nearly white, though a little yellowish.



Cotton-Plant.

How does Cotton grow?

In a husk which contains a hard seed. When this is quite ripe, the husk opens, and a little bunch of fibrous cotton is found attached to the seed.

By means of what instrument is the cotton torn from the seed?

From large quantities the cotton is torn from the seeds with great rapidity by means of a powerful machine called the Cotton-Gin.

In what countries is Cotton produced?

In warm countries; in Southern Asia, in

Africa, in the Southern States of North America, and in Brazil. Cotton flourishes best near the sea. Certain islands near the coast of South Carolina produce the best cotton known. This is called Sea-Island cotton.

Is the use of Cotton very ancient ?

Yes ; cotton has been used in Persia, India, and other Asiatic countries from the remotest antiquity. India cotton goods were formerly exported to England and the United States. Manufactured cotton is yarn, cotton cloth, Chintz, and Calico.

What are Calico and Chintz ?

They are cotton cloth stained or painted in different figures. Calico makes dresses for women and children ; chintz, stamped in larger figures, is used for coverings of furniture, beds, sofas, and chair cushions.

Of what are Stockings made ?

Of Worsted, a woollen yarn, of cotton thread, and also of silk. Stockings are both knit and woven.

Are India cotton goods still exported ?

No, because the great quantities of cotton produced in the United States, and manufactured here and in Britain, are sufficient for the uses of the inhabitants.

Is cotton a native of this country ?

Cotton plants were first conveyed to Europe from Persia, and other Eastern countries. Having been sent to the Bahama Islands, some of the seeds thence conveyed were planted in Georgia in 1786 (above sixty years ago). These were the parents of all our great cotton crops since produced in the United States.

What has extended the use of cotton ?

Many machines that have improved the modes of working it. That of Richard Arkwright, invented in 1769, and other later inventions, especially the Cotton-Gin.

Who invented this machine ?

Mr. Eli Whitney, a gentleman belonging to New Haven. Before this machine was invented, the preparation of cotton was so slow and laborious as to make it of little value.

Are machines of immense service to mankind ?

It cannot be imagined of how much use they are. Our hands are natural instruments, which, alone, could accomplish but little for our necessities and comforts. How much more rapidly does the steam-engine, that mighty machine, carry us over the ground than our own feet could do !

Who contrives instruments ?

The Mechanician contrives them : the *Mechanic uses them*. We call the Inventor a

person of "mechanical genius." These are great benefactors of mankind, diminishing the toil and increasing the comforts of millions of their fellow-creatures.

Who chiefly cultivate cotton in the United States?

The proprietors of lands called Plantations employ their negro slaves in this occupation. Nearly one million of colored men, women, and children, are thus employed. The Planters, the gentlemen owners, sell the cotton to the Merchant, who again sells it to the Manufacturer, who provides all persons with such cotton articles as they will purchase.



Woman Spinning.

What is Flax?

Flax is the fibres of a plant cultivated in *Europe* and in the United States. The flax *stalks*, when ripe, are pulled up and laid in

bundles; these are steeped in water, and when dry the seeds are broken from their tops.

What is then done to the Flax?

It is combed out with a comb, properly called the Heckle. The teeth of the heckle are of steel, and about four inches long. These teeth are fixed in a square board, or piece of wood, with their sharp points standing up, and the flax stalks are drawn over them.

What effect has Heckling upon flax?

It separates the threads, or fibres, within the stalk, from the dry hull, or husk, on the outside of it. The flax, when heckled, resembles so much hair in appearance; thus we hear of "flaxen hair."

Is the Fibre all alike?

The longer and finer portion is only called Flax, while the shorter and more woody part is Tow. Flax is stronger than tow, but tow serves to make coarse brown cloth.

Into what is flax chiefly manufactured?

Into Thread for sewing, Linen, and Lace; these are made white by bleaching. Fine table-cloths, napkins, and towelling are made of flax.

Will flax run out in spinning to a very fine thread?

One pound of flax will run to 11,170 yards of thread, and indeed to a much

greater length : of the finest thread French cambric is made..

In what country are great quantities of Linen made?

In Ireland; the best linen we have is brought from that country. Flax is sometimes cultivated for home consumption.

Is flax ever spun in our houses?

It is manufactured in families, being spun into thread upon the spinning-wheel, and then woven in the domestic loom for bed linen, table-cloths, and the wear of the household.

What is the general substitute for linen?

Cotton cloth, which is hardly one-quarter of the price of linen.

What is Cambric?

An extremely fine manufacture of flax thread, made in France. We use it for frills and for nice pocket handkerchiefs. The principal manufactures of linen-cambric, and fine lace, are in Valenciennes, in the north, near Belgium.

What does Solomon say of a virtuous woman?

In Proverbs, chapter xxxi., king Solomon describes a good housewife of his time, one thousand years before Christ. He says, "She seeketh wool and flax, and worketh willingly with her hands." And also he says, "*She maketh fine linen and selleth it.*"

Who does this woman resemble?

The industrious farmers' wives of the present day, who live far from towns, where they might buy what they now make with their own hands.

Has flax other uses besides those you have mentioned?

Flaxseed tea is remedial to sore throats and colds. This seed contains oil, which may be pressed out. This is called Linseed oil, and is used by the house-painter in mixing his colors.

Of what are Sails and Ropes made?

Of Hemp. This plant, like flax, contains strong fibres that can be dressed and woven into cloth. Hempen cloth is of so firm a texture that it is better fitted to resist the winds at sea than any other.

What besides sail-cloth is made of Hemp?

Cordage, or Ropes; these are of greater or less thickness, according to the use required of them. The largest kind of rope is the Cable, used in managing a ship. A roll of this great rope may often be seen coiled up on the deck or floor of the ship. Ropes are useful for many purposes.

Where does Hemp flourish?

Both in warm and in cold countries. Rus-

sia produces great quantities of hemp. Another article is brought to the United States from Manilla, one of the Philippine Islands, which resembles Hemp, but which only serves to make ropes.

What are Pins?

Pins are pointed instruments made of brass wire, used to fasten one part of dress to another. All people do not use brass pins; savages use thorns and fish-bones for their purposes: our nice pins have not always been used in Europe.

When did modern pins come into use?

In the sixteenth century pins of bone, ivory, and silver, were employed in England, but poor people made no use of these, which were larger than our pins in common use.

When did these come into use?

Not all at once; pins were made better and better until they were of all sizes, and being stuck in papers, are now in general use.

How many persons are required to make a pin in England?

One cuts the wire into lengths intended, *another makes* the point, another the head,

another puts it on, another plates or washes them over, and at last they are stuck into papers. Some other operations employ ten persons on each pin.

What is Division of Labor?

It is the employment of several persons to begin and complete different parts of a manufactured article. Each does his own work only.

Could not one person make a pin?

Not with the quickness with which it is now made. "Many hands make light work" is a proverb, and very true.

Are pins made in the United States?

Very good pins are made in Poughkeepsie, in the State of New York.

Are pins made in Connecticut?

They are, and by a machine invented there which requires the attendance of one person only to cut the wire, to point, and head the pins.

Are the Americans famous for Mechanic invention?

This talent they possess in great excellence, and have contrived numerous machines which diminish labor, or make it easier.

What are needles?

A steel instrument used in sewing, which is called "needle-work." Needles are of different sizes, from the mattress-needle (five or

six inches long) and the sail-needle, to the cambric-needle, which carries the finest thread and makes the finest work.

Were needles known to the ancients?

They must be as ancient as sewing, but steel needles came first to England from Spain and Germany; they were first manufactured in London by a German in 1565. English needles are accounted the best that are made.



Silkworm.

What is Silk?

Silk is the production of an insect, the Silkworm, sometimes called the "spinning insect." The Silkworm is subject to transformation.

What is Transformation?

It is a change of form or shape. The winged Moth, called *Bombyx-mori*, deposits eggs, and leaving them, soon dies. The *parent insect* leaves the eggs where the young

Larvæ may find proper food when hatched, and are become Silkworms.

What are Larvæ?

The animals called Grubs, Maggots, and Caterpillars, are larvæ. The larvæ of the *Bombyx-mori* is what we call the Silkworm. Its proper food is the leaves of the Mulberry tree. The insect is said to deposit two hundred eggs.

How do people obtain Silk?

They procure the eggs, and keep them in a place where they will hatch. When the larvæ appear they are supplied with fresh mulberry leaves every day for about eight weeks. Then the worm, full grown, ceases to eat, and soon becomes a Chrysalis.

How is that done?

He spins from his body a silken fibre, in which he gradually rolls himself; then he is a Chrysalis. He ceases to eat before he begins spinning, and is furnished with a little brush of broom on which to make the cocoon. This silken ball thus made is of a yellow color. It is about five days in making.

How long before the Chrysalis comes forth?

He remains two weeks in a torpid, or sleeping state within the cocoon, and then, *making his way out*, appears as the *Bombyx*.

mori. He eats through the cocoon, leaving the threads of it in short pieces of no value.

How is the silken thread obtained?

As it is known by the cultivator of silkworms when the Chrysalis will begin to gnaw his way out, the Cocoon is thrown into hot water before he begins his operation, and the Chrysalis is thus scalded to death. Afterwards the silken thread is reeled off, and made ready for sale.

How thick are these fibres?

They are so light and fine that many are reeled together to make the thread, which is woven into ribands and piece-silk. The silk is divided into coarser and finer. The former is Raw silk. Sewing-silk is made of fine smooth silk.

How much silk is taken from one Cocoon?

The fine fibre, when reeled off, sometimes measures three hundred yards. It is said that fourteen yards of thin woven silk may be made of one pound of prepared thread.

What is made of Silk?

Ribands, stockings, and many kinds of woven silk, more or less costly and beautiful. Silk is dyed of many colors, besides being made quite white. Silk is a great luxury, *making the most elegant apparel for ladies,*

and the richest embellishment of house furniture.

What is Velvet?

It is a manufacture of silk. Threads of the substance are drawn up from the woven web, over its whole surface, and being cut and smoothed, the Velvet has an appearance of downy softness and richness; it is used to make rich dresses for ladies, and sometimes for gentlemen. Ladies often wear bonnets made of velvet.

In what countries are the best silks made?

The best come from France. In the city of Lyons are the largest number of factories. In Spain, Italy, and England silks are manufactured. In a certain quarter of London called Spitalfields, the best English silks are made.

Was the Silkworm a native of Europe?

No: Silk is used by the rich all over the East; in China, British India, Persia, and Turkey. China is supposed to have given silk to Europeans.

How did that happen?

Two travellers from Europe being in China, in the sixth century, procured some eggs of the Bombyx, and putting them into a hollow cane, brought them to the emperor Justinian,

in Constantinople, and also taught how they should be taken care of to produce silk.

Was this a great service done to Europeans?

It was, for these silkworms were the parents of all those which for so many centuries have furnished silk to Europe, and now furnish it to us.

What are bonnets generally made of?

They are made of silk over a frame of wire or buckram, of plaited straw, of Felt, which is manufactured of wool stiffened and pressed over a block, and of velvet.

What is a Beaver hat?

A hat of which the foundation being wool and fur, has the outside neatly covered with the fine glossy hair of the Beaver, an amphibious animal found in Canada.

What is a Fan?

An implement designed to be struck against the air, in order to agitate or move it quickly from the person who uses the fan. The motion drives off the warm air from the face, and allows the cooler air beyond to take its place, thus producing the sensation of coolness.

Of what are fans made?

They are made often of paper pasted upon sticks of wood or ivory. This sort of fan can be folded into a small space. They are also made of feathers, and of the Palm leaf. Pec-

ple in the East use fans and Umbrellas; the former often to drive away flies, and the latter to shield them from the sun. Europeans and Americans have adopted these inventions from Asia.

What is Leather?

It is the skin of dead animals scraped quite clean and fitted for different uses, according to the kind of skin.

To what uses is leather put?

Boots, shoes, gloves, saddles, harness for horses, and binding for books, are all made of leather. The Tanner and Currier, Dresser, and many other mechanics, are employed in the manufacture of leather.

What are the Tanner and Currier?

The Tanner takes Cow and Ox skins from the butcher, and, first rubbing them over with lime, puts the Hides, as they are called, into pits containing tan-bark pulverized, and water.

How long are the hides kept in the Vat?

When the leather has been long enough immersed in the pits or vats to make good leather, it may be taken out, dried, and used. This is the Tanner's Craft, or Trade; it is his *Business*.

What effect has Tanning on leather ?

The tan-bark is so called because it contains a substance called Tannin ; the leather, when put into the vat, is very soft, and full of pores, or little holes. The tan is spread over each hide, and water is poured over the whole ; the hide soon Absorbs or soaks up Tannin. This substance changes the quality of the leather.

How does this process alter the leather ?

It both shrinks and thickens it ; when taken out of the vat and dried, the hide is stiffer and stronger than before. Tanned leather is used for the soles of boots and shoes.

What is done by the Currier and Dresser ?

The Currier takes the skin of the smaller animals, puts some lime on them, scrapes off the hair and all impurities, and then, when ready, gives it to the Dresser, who colors it and prepares it for the shoemaker or the glove-maker.

What is Chamois Leather ?

It is the dressed skin of the Chamois, a sort of Antelope found in Switzerland. The Chamois is a great climber and leaper, and lives amid the rocks and mountains of Switzerland. Such is the fleetness of this animal, that he easily escapes from his pursuer.

How is he caught ?

A party of Hunters join in pursuit of him, and often take several animals in one day's chase. Hunting the Chamois, among Alpine precipices, which he leaps over with admirable agility, is a dangerous pursuit, and many of the hunters lose their lives in it.



Chamois Goat.

What is the quality of Chamois ?

When dressed, it is very soft, and, dyed black, looks not unlike Velvet.

What is Russia leather ?

It is leather brought from Russia, which is so dressed that it has a very agreeable odor. We use cow-skin, sheep-skin, goat-skin, calf-skin, and that of some other animals. 18

What are Furs ?

They are skins of animals with the hair left upon them.

Is the use of Fur an ancient practice ?

Yes ; furs contribute greatly to warm people in cold countries, and in cold seasons of the year. Before men learnt the art of weaving, they wore clothing of fur ; the Greenlanders and Esquimaux make entire garments of seal-skin fur ; they also make their beds and bed-covers of these skins.

What are Seals ?

Amphibious animals found on the coasts and in the Pacific Ocean itself, and useful to the neighboring natives for great quantities of oil which they furnish, and which is burned in their dwellings, as well as for the clothing they afford.

What Fur is most valued ?

That of the Ermine, a little animal not bigger than a rat, found in the cold regions of Asia and Europe. It is often called "the precious ermine." The fur is short, smooth, and purely white, and is so difficult to obtain that it can only be worn by rich persons.

What are Sable and Martin ?

They are Russian and North American furs from small animals, and make expensive *muffs*. Foxes, Beavers, Raccoons, Rabbits,

Hares, and Squirrels afford Furs for inferior uses; and the hair of some of these is employed in the manufacture of hats. Furs are sometimes called Peltry.

What are the materials used in Sewing and Knitting?

They are flaxen thread, white and colored, cotton thread, worsted, woollen yarn, and sewing silk. Worsted is the stronger and longer fibres of wool twisted into a thread-like form. Worsted is much used in embroidery, often called "Worsted Work."

What does Worsted Work represent?

It often imitates flowers, animals, human figures, and landscapes.

What Embroidery is greatly admired?

That of the Gobelines, near Paris. This Tapestry, as it is called, imitates the finest pictures with complete resemblance. It sometimes takes from two to six years to finish a piece, so that it is very expensive, and none but very rich persons can obtain it.

Was Tapestry more in use formerly than now?

Much more, because in great houses it once served the purpose of the colored paper we *put upon walls*. Large pieces of tapestry

were hung upon the walls on hooks prepared for them. These were called "Tenter-Hooks."

What was this tapestry often called ?

It was called the Arras, because some of it was manufactured in Arras, a city in Belgium: A man could easily conceal himself behind the Arras. Worsted, gold thread, and silk of various colors were wrought into fine tapestry.

Did great artists make patterns or designs for tapestry ?

They did. Raphael, a great Italian painter in the sixteenth century, made twenty-five designs on Scripture subjects to be embroidered for the Pope of Rome.

Are these in existence ?

Seven of them are at Hampton Court, a palace near London belonging to Victoria, the present queen of England : these are known as Raphael's Cartoons ; they are regarded as works of wonderful beauty : the other Cartoons, except three, have been destroyed.

Are Shawls ever embroidered ?

The famous Cashmere Shawls are very elaborately embroidered.

Where are these shawls made ?

In the valley of Cashmere, a country of Asia. The shawls are made from the soft hair of the Cashmere goat ; these shawls are *sold in Asia* and in Europe to such persons

as can afford to buy them: some are imported to the United States.

At what prices have these shawls been sold?

A Cashmere shawl of the richest pattern has been sold for fifteen hundred, and for two thousand dollars.

What ornaments are sometimes worn by ladies?

What are called Gems, or precious stones, besides Coral, Carnelian, Jet, Pearls, Amber, and wrought Gold and Silver. Gems are mineral substances found in mines. They are afterwards cut, polished, and set in gold, in brooches, ear-rings, finger-rings, buckles, and head ornaments.

Who prepares these stones?

Being conveyed to different places, from Russia, Hindostan, Brazil, and some other countries, they are fitted to be worn by the Lapidary and the goldsmith, sometimes called the Jeweller. He who works on the stone only, is the Lapidary.

Do Kings and Queens wear jewels?

They do. Kings and queens, at certain times, wear a sort of wreath on their heads, called the Crown; this is composed of Gold and Jewels. The jewels kept for their use on important days are called the Crown Jewels and the *Regalia*.

What are the gems most valued?

The Diamond, Ruby, Emerald, and Sapphire; then the Amethyst, Topaz, and Garnet. Some others, as the Beryl and Turquoise, are much esteemed.

What does a diamond resemble?

A piece of clear and brilliant white glass; but the diamond is much more sparkling, or lustrous, than the glass. It is the hardest of all natural productions, and has been called Adamant.

Are all gems white?

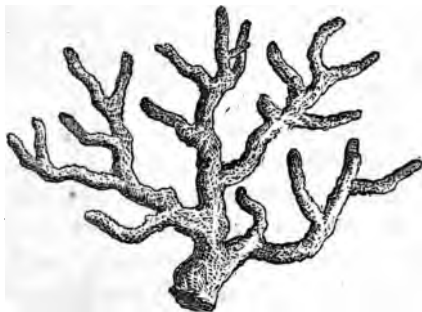
They are of different colors; the Ruby is dark red, the Emerald green, the Sapphire blue, the Amethyst a pale purple, the Topaz yellow, the Garnet red, but less valued than the ruby, the Beryl light green, and the Turquoise blue.

Are precious stones very costly?

Yes; especially the diamond. A diamond now in England, brought a few years ago from the East Indies, is half as large as a hen's egg, and is valued at above one million of dollars. The queen of Portugal and the emperor of Russia possess each a diamond *almost as large*.

What is the common size of Diamonds?

One-half the size of a ripe pea is accounted a large one; smaller ones vary from that to the size of a large pin's head; some, in bulk between these, are frequently seen in necklaces and rings. Other gems are of more moderate cost than diamonds.



Corals.

What is Coral?

A substance found in the sea, formed by animals called Polypi. These are so numerous as to form what are called Coral Reefs, masses of coral lying under water to great depth, which vessels may run upon and be Wrecked; that is, broken and destroyed.

What is the color of coral?

Often it is of a pure white, and puts out *knotty branches* like the wood of a dried

plant. The kind most used for ornament is very hard, smooth, and of a beautiful red color. This is often made into beads for the necks of infants. The red coral looks somewhat like sticks of red sealing-wax.

Where is coral found?

In the Mediterranean about Marseilles, Tunis, and Sardinia, and in the Indian Ocean near the islands of the Eastern Archipelago. Coral reefs sometimes fill up harbors by their rapid increase.

What is Carnelian?

A stone of a reddish color, sometimes purely red, sometimes quite white, and sometimes streaked with different shades of red. The carnelian is often made into seals, beautifully cut in different figures. A ring containing a seal is called a Signet-ring.

What do we call a Seal?

It is some adhesive substance, like Sealing-wax, attached to papers containing something written, as the seal upon a letter. Upon the sealing-wax, while yet soft, is impressed the Seal, which leaves the figure cut in itself upon the wax. This is often some design or Device, as the figure of a Dove, signifying *Love and Friendship*.

Are there other uses of Seals ?

There are. When persons make an agreement concerning some important business with others, they cause to be written out what each person intends to do in that matter. This is a Contract. If land or a house is sold, or given by one man to another, the whole business of such a sale is written in a paper called a Deed. To Contracts and Deeds seals are affixed.

What is that done for ?

To show that the agreement is Concluded, or finished, and that it is Valid : that is, that it cannot be broken ; that the whole transaction is true.

How is a Signet-ring used ?

In Eastern countries a person who gives out written orders, to absent people, stamps them with his signet-ring. His signet is known as well as himself, and he who bears it is received as a true messenger from the owner.

What are Pearls ?

They resemble white beads, from the size of a pea to a pin's head, and are set in pins and rings. They are found in oysters in certain places on the coasts of Ceylon, and near *some of the Pacific islands.*

How are these pearls obtained?

By diving under water for them. The pearl-divers tie a strong bag to the waist, and plunging down to the oyster-bed, tear up oysters as quickly as possible, and rise above the water to deliver them to persons in waiting.

How does the Diver live under water?

He learns to stop his breath for two or three minutes. This diving is done at a particular season by great numbers of very poor persons.

When are the pearls taken from the oyster?

The oysters are put in pits in the ground, and, being covered over, are left to decay. Some months after, the shells and all remains of the oysters are carefully picked over, and the pearls are taken out.

What is mother-of-pearl?

The smooth, glossy inside of a sea-shell, taken off in pieces, which are inlaid in boxes and other works in Papier Maché.

What is Jet?

A hard species of Coal. It is perfectly black, and takes a fine polish. It is very brilliant, and is worn for ornaments by per-

sons who dress in black. "Black as jet" is a common comparison. Smooth black glass ornaments are imitations of Jet, and are cheaper.

What is Amber?

This substance is found on the sea-coast, especially on the Baltic. It looks like the transparent gum which issues from fruit-trees. When first found it is rather soft, and is of a deep yellow color, but it hardens, and is cut into beads for necklaces. When rubbed, it emits an agreeable odor.

Is amber a vegetable, animal, or mineral substance?

It is not known to which kingdom of nature it belongs. When it incloses a few fibres of straw or some delicate insect, amber is most valued, because such pieces are very rare.

Do all people like Ornaments?

They do; the rudest Savages put on feathers, wear bits of shining metal, and paint their faces that they may look the better for it; and civilized persons wear fine silk, costly jewels, expensive shawls, and feathers of foreign birds, when they can afford to buy them.

Is there any Duty concerning dress?

Yes; our Apparel should be neat, carefully *attended to*, and be suitable to our age, our

occupation, and our fortune, not more expensive than we can well afford to pay for.

What does neat Apparel show ?

It shows that we take care of ourselves, and that we respect ourselves. Neatness and cleanliness extend to the person ; a clean skin is as needful as clean and proper garments. People do not respect us if we do not respect ourselves.

Are some persons foolishly fond of Ornaments ?

Many are so, and they buy and wear cheap imitations of precious stones and of gold and silver. These soon tarnish and look very mean. A plain dress well made looks far better without them.

What are Cameos ?

A Cameo, often worn as a brooch, is cut upon a stone formed of plates or layers of different colors ; the upper plate being cut away, leaves the figure or design above the colored ground beneath. Cameos are often very beautiful.

Is a Cameo cut like a Seal ?

No ; the Seal has its figures hollowed out, but when pressed on a soft surface leaves the figure raised upon that. The figures on the Cameo are raised like those stamped upon *sealing-wax*.

What is Relief?

When figures are raised upon a surface, they are said to be in Relief, as those on a piece of money. The finest cameos are made in Rome.

What feathers or Plumes are worn as ornaments?

Those of the Ostrich and the Bird of Paradise are the most elegant. The Ostrich is a tall bird, so large that a man may ride on his back. The Ostrich is found most frequently in Africa and Asia.

Is the Ostrich a fleet bird?

It is more fleet with its legs than with its wings. The wings are very short compared with the size of the bird, and cannot sustain its weight, but its strength and speed are extraordinary.

Of what size are the eggs?

About as large as a young infant's head. The parent bird makes a pit in the sand for reception of her eggs, raising a bank around it as a protection. It is not known how many eggs she deposits in the nest, but it is believed that one bird does not lay more than ten.

Does the Ostrich sit on her eggs?

She sometimes leaves them to be hatched

by the sun when the sun's rays are very hot; but in cooler countries she sits on them until the young ones are hatched; and if she do not, she always watches the nest. The eggs are sometimes eaten by travellers, and also by the Hottentots, and are good food.

Who takes care of the little ones?

Their own instincts teach them to find their proper food, and they need no other care; they are gregarious, and keep together. In the book of Job it is said by one man to another, "Gavest thou feathers unto the Ostrich, which leaveth her eggs in the earth, and warmeth them in the dust? She lifteth herself up on high, she scorneth the horse and his rider."

How does she scorn the Horse?

She does not fear him; she is more fleet than the Horse or the Greyhound; she does not fear the hunter, and can only be taken in flight by Missile Weapons, that is, by stones or by some sharp instrument thrown at her.

What is she taken for?

To obtain the tail-feathers, which, being colored and dressed, form plumes for ladies' bonnets, and are much worn in winter.

What is the Bird of Paradise?

An exceedingly beautiful bird found in

New Guinea and the adjacent islands. Its tail-feathers, of a golden yellow richly shaded, form a graceful curve ; they bring a high price.

How are the plumes preserved ?

When the bird is dead, the skin with the tail attached to it is carefully drawn off, and dried upon a stick in smoke. Sometimes the legs and feet are also retained.

Are these birds gregarious ?

Yes ; they live in troops in the vast forests of those islands : they are migratory birds, changing their quarters at certain seasons. They love the Teak tree, sheltering in its foliage, and feeding on its small fruit.

Can this bird bear confinement ?

Yes ; it is kept in Aviaries and in Cages in China. A traveller once saw one in the island of Macao (pronounced Macow) which had been so kept for nine years. Its food was insects and rice.

Do men wear the plumes ?

Turkish princes and army officers consider them a great ornament, pay great prices for them, and wear them in their turbans.

What is a Prince ?

He is a King's son, or a member of his

family, or the owner of some large estate in Germany and Italy, and also in Russia.

What is an Aviary?

It is a house or inclosure in which foreign birds are kept to gratify the curiosity of the owner, and sometimes of the Public.

What articles are especially necessary to keep the person clean and comfortable?

Combs, brushes, soap, and sponge.

Are combs of different sorts?

They are. There are fine-combs, made of Ivory, to clean the hair; horn combs, to disentangle and smooth it; and combs of horn, and of Tortoise-shell, to keep it in convenient form on the head of females.

What is Ivory?

The substance of Elephants' tusks or teeth. The teeth of the walrus also affords Ivory. Ivory may be beautifully carved; it makes knife-handles, combs, fan-sticks, the staff of parasols, paper-knives, and many other useful and pretty things.

Where are Elephants found?

In Asia and Africa, and in the island of Ceylon. Great numbers of them are taken for their ivory tusks, and for the service of

man. Ivory has been in great esteem for many centuries. The Greeks and Romans made use of it.

What are Fossil elephants?

Such as have been buried in the earth for ages, and are disinterred. The tusks of the fossil elephant do not afford ivory so white and pure as those of one recently killed. Fossil tusks are found in the northern parts of Siberia, and are much wrought in Russia.

Do other fossil remains exist in Siberia?

Those of the Mammoth have been found. The Structure of this immense animal resembled that of the elephant, but the species is now Extinct, or not living. The Mammoth and Elephant belong to the graminivorous tribe of animals. An elephant in a rice-field is very destructive.

Can wild elephants be tamed?

Yes; they are taken with a sort of trap, made of beams or great bars of wood. When one unwarily enters this, a bar falls and shuts him in.

How does he like this?

The elephant, male or female, at first makes a great noise, and tries to extricate itself, but *at length is forced to submit.* The elephant

thus taken is fed, attaches himself to his keeper, and learns to labor.

What can he do ?

He can draw heavy loads, and carry a sort of tower on his back for travellers, who often take journeys by this mode of conveyance.

What is the Walrus ?

The Walrus, also called the Sea-cow, is common in the Arctic Ocean, and will attack a boat full of men. He resorts to the icy shore, and may sometimes be found asleep there. He is a quadruped, though belonging properly to the sea.

Is the Walrus gregarious ?

He is, and it is said that one out of a herd of these animals serves as a sentinel while the rest sleep. A sentinel is a Watcher. When the flock is alarmed, they precipitate themselves into the water to escape from danger.

For what is the Walrus pursued ?

For his Oil and his Tusks, or long teeth. These point downward and bend inward, and are often two feet long. These tusks are ivory, and of equal whiteness and durability with those of the elephant, and serve the same uses.

What is a Tortoise ?

The Tortoise belongs to the class called Reptiles, and will live both on land and in water. A Tortoise is sometimes not bigger than one's hand, but is often much larger. He has a small head, four feet, and a tail. His whole body is inclosed in two shells, the upper and under shell.

Is he a timid creature ?

Yes, and when he is alarmed will draw his head, feet, and tail into his shells, and close them so firmly that no force can open them. The upper shell is formed of thirty-seven thick scales united together. Inside of this is the substance called Tortoise Shell, of which combs, boxes, and sundry articles are made. The Tortoise abounds in the Mediterranean Islands.

For what is this animal remarkable ?

For longevity, or long life ; one is known to have lived one hundred and twenty years in a garden at Lambeth, near London. This fact was known by a date cut in the shell at a former time, and compared with the present.

Is the Tortoise harmless ?

He is, feeding on insects and worms, and sleeping, during winter, in a hole in the

ground, which he lines with grass and leaves.

What Brushes are used for purposes of Cleanliness ?

Tooth-brushes, hair-brushes, nail-brushes, and house-brushes of various kinds. Tooth-brushes have a handle of ivory, or of bone prepared to resemble ivory, with short stiff bristles, that is, hogs' hair, attached to the end. Nail-brushes are larger and stiffer than a tooth-brush, but are made of similar materials.

Are Hair-brushes made of the same material ?

Not exactly ; Hair-brushes, much larger, have a wooden handle which is extended into a wider space at the end. Into this part the hairs are inserted.

Is Hair otherwise useful ?

Horse-hair is woven into a black shining cloth, which forms a durable covering for chairs and sofas ; and the hair of cows' tails, brought from South America, makes comfortable mattresses and cushions.

What is Soap ?

Soap is made of oils, tallow, or other fat boiled with soda or potash. Soap may be hard or soft. A little salt put into the soap *while boiling*, makes hard soap.

Is Soap of only one quality ?

It is of several kinds, more or less nice. Our common brown or bar soap has resin in it. Nice soap for shaving is often perfumed. Soap is used when water is applied to clean the skin.

Does it clean other things ?

Soap mixed with water forms Suds ; Suds, when it contains much soap, throws up, on the surface of water, bubbles filled with air, called Lather. Clothes which have been worn are made clean by washing and rubbing in soap and water.

Does Soap serve many domestic uses ?

It does, being added to all water used in scrubbing floors, and culinary utensils. Culinary signifies belonging to the kitchen and to cooking.

Have all people soap ?

No ; some savage and half-civilized people never saw soap. They wash what they wish to purify in water alone ; but that is less easy than to do the same work with the assistance of soap.

What are Alkalies ?

All Salts are not table-salt, but some other substances are called salts. Alkalies are salts : they are Soda, Potash, and Ammonia. *Soda is obtained from common salt, and from*

sea-plants. Potash is obtained from burnt wood, and Ammonia from animal Remains; from substances which have formed parts of an animal when living.

What use is made of Alkalies ?

Many uses ; one is to neutralize Acids ; that is, to take the sour taste out of them. Sal-Æratus is a preparation of Potash, which put into sour dough, will change it so that sweet bread may be made of it.

What is Sponge ?

A soft brown substance which contains many pores. When the dry sponge is dipped in water, the pores absorb the water and Dilate, or swell the sponge to twice its former size. It is taken from rocks under water.

Where is sponge found ?

On all the coasts of the Mediterranean. The Sponge is used in bathing, and also in Surgery. When blood flows from any wound, sponge applied to it absorbs the blood more conveniently than other substances.

Of what does human food consist ?

Of animal and vegetable products, frequently prepared by cooking: by boiling, roasting, broiling, frying, and baking. The lower animals eat their food or aliment in a *natural state*.

Do we use Minerals for sustenance?

Common salt is a mineral substance. Some minerals are used for medicine in water, or in the form of drugs. There are what are called Mineral Springs in the earth; the water may contain common salt, may run over Limestone, Sulphur, or Iron, and imbibe some of these substances.

Can they be seen in this water?

No; but they may be tasted. The lime or iron is held by the water in solution: that is, a small portion of the mineral substance is distributed through a large measure of water, as a lump of sugar is dissolved in a cup of tea.

For what are mineral waters used?

Sulphur Springs afford relief to rheumatism, others to consumptive patients, and some cure Cutaneous diseases, that is, diseases of the skin. Springs containing Iron are Chalybeate.

What Minerals are used as medicines?

Mercury or Quicksilver in certain preparations, as Calomel and Blue pill. Sulphur and Borax are also used as medicines.

Who prepares medicines?

The Druggist, or Apothecary. The art of preparing drugs is Pharmacy. The house from which medicines are given without pay to *poor sick persons* is a Dispensary.

What is the Pharmacopia ?

All medicines together form what is called the Pharmacopia. Medicines are Simple or Compound ; that is, containing but one single substance, or composed of several.



The Poppy.

What medicines are Narcotics ?

Those which produce sleep, and which, taken in too large a quantity, cause death ; Opium is the principal narcotic, and is employed as a medicine to relieve extreme pain. One preparation of it is Morphine.

Is opium used for any other purpose ?

It possesses the property of Inebriating when taken in certain quantities, and is used as a Stimulant. A Stimulant is any substance taken into the mouth by inhaling it, to

make people feel better, as the smoke of a cigar ; or into the stomach, by swallowing, as brandy, or other spirits, and Opium, which in the liquid form is *Laudanum*.

Are Stimulants wholesome ?

No, except in certain cases, and moderately used, they are injurious. Stimulants are taken to produce an agreeable sensation ; to make the consumer, as he thinks, more comfortable. The use of Stimulants is a bad habit ; the more one takes the more he wants.

Of what is Opium made ?

Of the expressed juice of poppies, from the capsule or vessel containing seeds. This juice hardens in the air, and is sold in cakes and rolls. Opium has a repulsive odor.

Where is Opium made ?

In India and in Turkey, and is exported in large quantities to China, to Europe, and to the United States. The Chinese and the Turks consume great quantities of this drug.

What sort of people use Opium ?

Both rich and poor. Like the love of spirits, the appetite for opium tempts poor people to buy it when they can procure money. Persons of better fortune, idle and ignorant, and *weary because they are idle and ignorant*, take

opium. They shorten their lives by this practice.



Tobacco Plant.

What is Tobacco ?

It is an herb, a native of Europe, Asia, Africa, and America, and may be cultivated in gardens and fields. The part used is the prepared leaves.

How is Tobacco prepared ?

The leaves are plucked at a certain time, and dried; they are packed in great hogsheads, and then sold by the cultivator to the Merchant, and by him to the Manufacturer, and by him again to the Trader, who sells it once more to the Consumer.

Who is the Manufacturer ?

A man who has the tobacco prepared for

sale. For this purpose some of it is rolled into a Rope, called Pigtail, and coiled up for use; or rasped into little fragments and sold in small parcels, or rolled into Cigars, while another portion is ground into powder, called Snuff.

Who uses these several kinds of tobacco?

Sailors and laboring men chew pigtail, other persons chew the rasped tobacco, while some smoke it from the bowl of a pipe. Cigars are smoked by lighting one end while the other end is in the mouth of the smoker.

Where are the best Cigars produced?

In the Island of Cuba. These, usually called Havana cigars, are sold at high prices; though some kinds are dearer than others. The cigars next in favor to the Havana, are those from Manilla. There an immense quantity is made annually.

What is a Cigar?

It is made of tobacco leaves rolled into a convenient form for smoking. Good cigars have a fragrant, or agreeable odor.

Where is tobacco cultivated?

In Syria, and in the Philippine Islands. The largest produce of it is in the American State of Virginia. It is also grown in Belgium, Holland, France, Southern Russia, Tur-

key, and Prussia. The Dutch and Germans are fond of smoking the pipe. They have ornamented pipes, often elegantly painted. This pipe is the Meerschaum. The Turks also indulge in smoking, and in elegant pipes.

Has tobacco always been known to Europeans ?

No ; the discoverers of America, about the beginning of the sixteenth century, learned to smoke of the natives, and afterwards taught the practice in Spain and Portugal. Tobacco was soon cultivated by the Spanish settlers in the West Indies, and exported to Europe.

Who first introduced it in England ?

The companions of Sir Walter Raleigh, who went on his expeditions to the new world, first introduced tobacco in England, where it soon came into use, and has continued to be used to the present time.

When did the Virginians first begin to cultivate tobacco ?

The first settlers colonized Virginia in 1606, and in 1615 they began the culture and exportation of tobacco.

For what is Snuff taken ?

In order to produce an agreeable titillation in the nerves of the brain. Snuff often causes sneezing, and is sometimes given to have this effect. Snuff is frequently perfumed.

What is a Perfume ?

A perfume is the odorous part of flowers, extracted in what is called an Essence. This is mingled with pure alcohol, and is often used as a gentle stimulant, refreshing to languid persons. Cologne water, called from the city of Cologne on the Rhine, is so made.

What perfumes are most valued?

Otto of Roses, more properly Attar, is highly valued in the East. Orange flowers make an agreeable perfume. Some persons scent their handkerchiefs and clothes with perfumes.



What is a Farm?

It is a considerable extent of land in the country, containing acres, more or less, which are cultivated for the use and necessities of *man*. *Part of this land is taken for Tillage,*

build houses and ships, work metals, and to make all the instruments employed in every sort of work.

How does the Farmer provide for the classes of men employed in Commerce and Mechanics ?

The Farmer feeds them all, producing grain for their bread, meats for their table, milk and butter to make other articles of food palatable, hay for their horses, and the leather, flax, wool, and cotton which serves for their clothing.

What do other classes for the Farmer ?

The Merchant imports many comfortable articles from distant countries for his use, and furnishes him with money by buying his produce.

What does the Mechanic for the Farmer ?

The Mechanic makes the Farmer's tools, builds his house and his barn, makes his carts and carriages, and also purchases his produce. The Laborer, in the house and out of it, assists all these. Thus all classes aid and depend upon one another.

What is a Garden ?

A private garden is a portion of land under cultivation, less in extent than a Farm. The farm is designed to furnish necessary articles, *as bread* and the flesh of animals, for the food

of man ; while the Garden affords fruits and vegetables.



The Rose.

What is the first Garden mentioned in History ?

The Garden of Eden, sometimes called Paradise. In this garden our first parents, Adam and Eve, were placed, to “dress and to keep it.” From Paradise they were turned out for their disobedience to the Creator.

Where was Eden ?

In Asia ; but its Site is not known. Man must now make his own gardens by his labor ; by “the sweat of his brow,” as the Scripture calls hard work.

What are Culinary vegetables ?

Such as are cultivated to be cooked in the Kitchen. Gardens containing only such are *often called Kitchen Gardens*. Gardens which

produce many ornamental plants are Flower Gardens.

Are all our Garden vegetables indigenous ?

Very few of them. The seeds of many have been brought from other countries : the summer and winter Squash are natives of this country, while the seeds of the Cantelope Melon were brought from Persia.

What are our chief Garden Vegetables ?

Asparagus, peas, beans, onions, turnips, cabbages, cauliflowers, beets, carrots, parsneps, salsify, cucumbers, tomatoes, radishes, lettuce, and celery ; besides herbs, as parsley, sage, rue, and sweet marjoram.

What are the small Fruits cultivated in gardens ?

Raspberries, Strawberries, and Gooseberries. The Fruits are Pears, Peaches, Plums, Cherries, Apricots, Nectarines, and Quinces.

What are the principal flowers in our gardens ?

Of the larger early flowering shrubs are the Lilac and the Snowball ; later in the season, is the Althea. The rose, in all its varieties, may be seen in gardens. The Crocus and Violet, the Tulip and Pansy, the Fuschia and the Pink, the Hollyhock and Sunflower, with many others in succession, *until the Asters, in great variety, close the season of flowers ; except those of the ever-*

blooming Conservatory, which defy the autumn chill and the winter's cold.

What did Mr. Wilberforce say of Flowers?

He said, "Flowers are the smiles of God's goodness;" they abound naturally in all countries; every cultivated flower grows wild somewhere.

Is any thing known of the gardens of antiquity

Yes; the Persians, Greeks, and Romans cultivated flower-gardens. Splendid Gardens existed at one time in Rome, which, though private property, were open to the public; the most celebrated were the gardens of Lucullus.

What is a Public garden?

It is a piece of ground in a town or city, containing shade-trees, ornamental shrubs, and flower-borders; walks beautifully disposed, and seats conveniently arranged for the accommodation of visitors.

What fine public garden is there in Bavaria?

There is one in Munich, laid out fifty years ago by Count Rumford, an American. This is called the English Garden.

Have American citizens any titles like that of Count?

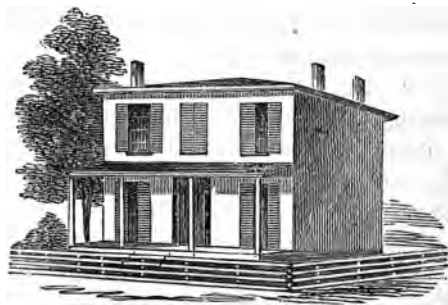
No; but Count Rumford, born and bred in New Hampshire, Benjamin Thomson, was made a count by some German prince to whom he rendered useful services.

What is a Botanic garden ?

It is a garden in which a great variety of flowers and plants have been collected from different countries. The Garden of Plants in Paris, Kew Garden, near London, and the king of Prussia's Botanic garden in Berlin, are esteemed the best in Europe.

What may be seen in these gardens ?

Palms from Asia, and many of the natural productions of Mexico, Brazil, New Holland, and the Cape of Good Hope.



A House.

What is a house ?

It is a habitation for man's use, either for a dwelling, or for some purpose. We speak of a dog-house, or a cow-house, but these are made by man for the shelter of Domestic animals.

What is meant by Domestic?

The word signifies belonging to a house, and often to the Household; that is, to the family residing in a house. Domestic are hired persons who help to do the work of the house, and who dwell in it.

Are there different sorts of houses?

Houses belonging to persons richer or poorer, are more or less spacious and costly; a rich man builds an elegant and expensive house, while a poorer person dwells in a poorer house, though the great house and the humbler one may be comfortable alike.

How are different houses described?

They are, beginning with the largest, Castles, Town-houses, Country-houses, Cottages, Cabins, and Warehouses, which last are stores designed as Depositories of goods, besides public Edifices.

Can you name some of these?

Yes; they are Churches, Court-houses, Town-halls, Theatres, Custom-houses, Exchanges, and Halls of Legislation, sometimes called Capitols.

From what was the name Capitol taken?

From a splendid Temple once existing in *Rome*. *The Capitol* of the United States is

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- in Washington; that of the State of New York is in Albany.

What is the art of building houses?

It is Architecture. The man who plans a house is the Architect. He thinks first how every room, door, window, chimney, and closet should be placed, and then draws a plan or pattern upon paper, which they who build the house must follow exactly.

What persons work on a House?

Carpenters, Masons, Stonecutters, Painters, and Laboring men. The carpenter works on wood, fitting it to different parts of the house; the mason lays the bricks in the walls and chimneys; the stonecutter prepares the hearths and chimney-pieces, and the laborers dig the cellar, and cart all the materials that are put into the building; the painter finishes it, by painting the wood-work of various colors.

Of what material is the outside of a house?

The walls of the house may be built of stone, marble, bricks, or wood; and it may be roofed with slate, wood, or thatch, which is straw made fast upon farm-houses, small cottages, and out-houses. Thatch is much used in England. Stables, Coach-houses, and *Barns* are out-houses.

What stone is put into houses?

Free-stone, sometimes called brown stone, gray granite, and marble. All these are dug out of the earth, and cut into shapes intended to fit one another. A stone house is generally more expensive than other houses.

What is Granite?

It is a very hard stone, forming, in the state of rocks, great part of the mass of the Earth; lying often below water and soil, and often rising above both.

What is a Quarry?

Any place containing a large extent of stone, which is there dug out and conveyed away, is called a Quarry. Granite contains black, gray, and shining white particles, and consists of many minerals united in its substance.

What is Marble?

A stone, consisting of limestone and other substances, and, like granite, wrought in quarries. It is frequently of a very pure white, and may be carved into beautiful forms. Marble takes a high polish.

What parts of a house are of marble?

Sometimes the outer walls, but more frequently the hall-floor, the chimney-pieces, and mantels. Marble slabs are often put

- upon tables and other articles of house furniture.

Are there different sorts of Marble?

There are many kinds, finer and coarser. Marble is purely white, white veined with blue, yellow, red, black, and sometimes mingled with different tints without any white. The purest white marble is that of which Statues are made?



A Statue.

What is a Statue?

It is the form of a man, woman, or child, made of marble, iron, or bronze. A very small one is a Statuette; that of the head and upper part of the person only, is a Bust; several figures together are a Group, as a mother and children.

Are there any Greek statues in existence ?

There are many in the museums of Rome, Naples, and Florence ; these are carefully preserved, and serve artists for Models, that is, for patterns to copy from.

How have these been preserved ?

Marble, when sheltered, is not subject to Disintegration or Crumbling, but will endure as long as time itself ; thus statues produced thousands of years ago may last as long as the world lasts.

How were many works of art destroyed ?

They were destroyed, that is, buried in the ground, or broken in pieces by ignorant people.

Who allowed such people to destroy them ?

In the fifth century rude tribes of men overrun Italy, and took possession of the country, killing great numbers of people, depriving every owner of his house and lands, and despising and injuring almost every thing beautiful.

Where did these ravagers come from ?

They were Goths and other barbarians who came from Germany, north of the Alps, and from countries further east.

Do their Descendants live now in Italy ?

They do: they and the posterity of the former

Romans are the modern Italians. After many years the barbarians began to learn religion and civility, and at length came to value whatever remained of ancient art, and carefully to preserve such remains.

How were the remains of Grecian art in Greece and the neighboring States demolished?

Chiefly by the Turks. These were formerly a people of Western Asia, who resembled the Goths in ferocity and ignorance. These established themselves in Constantinople, and in all the territories of the Greeks in the fifteenth century.

Was the Greek dominion extensive?

Yes, all the coast of Asia Minor, and all the coast from the Black Sea to the Adriatic, as well as the islands of the Archipelago, were inhabited by Greeks, but the Turks by degrees seized the whole.

Were they as destructive as the German tribes?

They were far worse, because they never desisted from destruction, and have never improved. The Turks are Mahometans, and despise all Christians; so they have no respect for our laws and manners, and their religion forbids them to make pictures and images.

What is now the best marble used by the Sculptor?

The best Statuary marble is that of Carrara,

in Italy. The Greeks thought the Parian marble, which was brought from the island of Paros, the finest.

Who were the most distinguished of the Greek Sculptors ?

Phidias and Praxiteles. Phidias was a native of Athens, and was born, it is supposed, nearly five centuries before Christ, (B. C. 480). Phidias produced many fine works in marble and in bronze.

What were the principal works of the ancient sculptors ?

They were images of their gods and goddesses, groups representing fables which the people believed, and embellishments of the public buildings. Phidias made two very famous statues, those of Jupiter and Minerva.

Who was Jupiter ?

The Greeks called him the "Father of Gods and Men," and the "Thunderer." The Romans worshipped Jupiter in like manner. Both these nations were Heathens ; they did not worship the Supreme Deity of the Scriptures, whom both Jews and Christians confess to be the only true God.

Did these people worship many Gods ?

Yes, their deities were male and female, *both gods and goddesses*. The Athenians

considered the goddess Minerva as their peculiar guardian, the Tutelary goddess of the city and the inhabitants of Athens; the one who took care of them especially.

How did they honor her?

By religious services; by prayers addressed to her, and by hymns in her praise at an Annual festival which all the people, men, women, and children, celebrated.

Where was the statue of Minerva placed?

In the great temple of the Parthenon, part of which still stands on an eminence in Athens, called the Acropolis. This temple was embellished by Reliefs from the hand of Phidias.

When did Praxiteles live?

He lived, it is assumed, about a century after Phidias. It is not known that any of his works exist at the present time, but it is related in history that they were highly esteemed by his Contemporaries, and long after he was himself no more.

Are there any Greek marbles in England?

Yes: the most famous are in the British Museum in London; these are the Elgin and the Xanthian marbles. The Elgin marbles are so called in honor of Lord Elgin, who *brought* them from Greece; the Xanthian

marbles were procured by Sir George Fellowes in Asia Minor.

What is Alabaster?

A substance resembling marble, but less Opaque and more brittle. It is perfectly white, and can be cut into small figures of great beauty. It is easily scratched and defaced.

Where is Alabaster found?

The finest is found near Volterra in Tuscany. It is cut into forms of great taste and beauty in Florence and Leghorn: the vases, boxes, and ornamental articles so produced are sent for sale to other countries.

What is Porphyry?

It is a fine, hard stone, of beautiful colors, found in Egypt, of which obelisks and pillars may be made.

What is an Obelisk?

It is a tall, four-sided pillar, mounted on a base or Pedestal, and standing on the ground. Obelisks in Egypt were generally placed in pairs, one on each side of the grand entrance of temples and palaces. An obelisk a little resembles the spire of a church, but the top, or Apex, is not pointed, but cut off.

Have Egyptian obelisks any Inscription?

Some are quite plain, but others have Hiero-

glyphics on them. These are figures cut in the stone, of birds and various forms, which, in the time the obelisks were erected, were understood to have meaning.

Are there obelisks in Europe?

Only such as have been brought with great labor and cost from Egypt. There are eleven of these obelisks in Rome, set up in front of Churches. They were transported centuries ago; the tallest is one hundred and five feet in height.

What is the obelisk of Luxor?

It is one standing in the Place de la Concorde, a public ground in Paris. It was brought from Egypt and set up in 1836, and is an interesting monument of antiquity.

What is Gypsum?

Gypsum resembles chalk, but is harder; when ground to powder, it is called plaster of Paris. It is sometimes scattered over fields, to make whatever is sown there grow more abundantly. Plaster of Paris is found in large masses at Montmartre, a hill near Paris.

Is Gypsum put to many uses?

It is the material of which plaster-casts

are made. Being ground to a fine white powder, it is mixed with water like thick paste; this mixture is put into moulds, and takes the shape of them. The Cast, as the figure thus made is called, is then taken out and dried.

What do Plaster-casts represent?

Sometimes they are busts of men or women, sometimes whole figures and groups; they also represent animals, as the Lion, the Deer, or the Dog. Sometimes they are Reliefs.

What can be learned by means of plaster-casts?

They can be moulded after the forms of the most beautiful statues in distant countries, and from these Imitations we can learn what such works of art are.

What are Nature and Art?

By Nature we understand God's works and God's laws. It is a law of Nature that Day and Night shall succeed each other; God ordered day and night to alternate, and they do so.

What is Art?

Art is a contrivance of man; first invented by his mind, and then executed by his hand. What one man invents and performs, others imitate. Arts are divided into Useful arts and *Fine arts*.

What are Useful arts?

They are those which keep us alive and make us comfortable. Agriculture, cooking, weaving, and shoemaking are Useful arts, while Music, Painting, and Sculpture are Fine arts.

Are the fine arts Luxuries?

Luxuries are things elegant and beautiful, but not essential to comfort. A house to dwell in is Necessary, but pictures on the walls are a Luxury. One employed skilfully upon the fine arts is an Artist, but a person who practises useful arts is an Artisan. An Inventor of arts, or of machines, is an Artificer.

What are Bricks?

They are little blocks of burnt clay, used in the building of walls and houses. The soft earth called Clay easily mixes with water. When the wetted clay has been well mixed, it is shaped in wooden moulds, and dried in the open air.

Are the bricks then fit for use? ●

No; they are piled up in heaps, with straw laid between each brick. An open space like an oven being left below, a fire is kindled and *kept burning* until the bricks are quite hard,

and of a red color. They are then ready to be used.

Are bricks very ancient?

They are: we read in the Bible that the Israelites in Egypt, fifteen centuries before Christ, could not make bricks without straw. Very ancient bricks are brought from the site of ancient Babylon. They were made of a soft earthy substance, called Bitumen, and dried in the sun; these bricks are of a yellowish color.

What is Lime?

It is a mineral substance, called, in Latin, Calx. The English word Calcareous, which signifies containing Lime, is taken from calx. Chalk is a calcareous substance.

Is the Lime used by the mason in a natural state?

No; limestone taken from the earth contains carbonic acid gas, and must be burned like bricks, in what is called a Kiln, to expel the gas: it is then lime, and is Caustic; that is, if touched by the hands it will injure the skin, and create soreness.

What effect has Water on Lime?

When cold water is poured upon lime it begins to Effervesce, or throw up bubbles, and with them heat. This process is Slaking. Lime must be slaked before it can be made into mortar or Whitewash.

What is the crust often formed inside of tea-kettles?

The water boiled in the kettle sometimes contains lime, which is deposited and encrusts the kettle. Lime, much diluted with water, is given as a medicine. Lime is contained in bones, and in egg and oyster shells.

What is Mortar?

It is a mixture of lime and water, used to cement bricks and stones, as Glue is used to join pieces of wood. The mortar hardens and keeps the wall entire. Mortar, formed into plaster, contains sand.

What is Glue made of?

It is made of a substance called Gelatin, commonly called Jelly. If the bones, skin, and hoofs of cattle be boiled in water, gelatin may be extracted, and when cooled becomes moderately solid.

Is Jelly wholesome food?

Yes; the jelly of calves' feet, with addition of sugar, and some wine and lemon to flavor it, is good eating. The inferior gelatin, made from skins and hoofs, is only fit for glue. Glue, bought in thin sheets, must be Dissolved, by boiling in water, before it will cement wood.

What is one of the most important articles in a house?

Glass. Glass is artificially made; it is a transparent substance, freely admitting light, and excluding air and water; it therefore forms excellent window-panes.

What did people do without Glass windows?

Savages in their poor dwellings have no glass windows at the present time; and, in hot countries, openings without glass let in air and light, but it is supposed that plates of semi-transparent horn served to let it into some houses. The grandest houses of Greeks and Romans had no glass windows.

Is the manufacture of Glass modern?

No; glass was known to the ancients, but not glass windows. Glass beads and cups have been found among very ancient remains. In the seventh century glass was brought from France, or Belgium, to England, for the windows of a new church.

Was not glass then adopted for house-windows?

No, not until the middle of the sixteenth century, about three hundred years ago. The panes were then diamond-shaped, and about five inches in length. They were joined by strips of lead.

Can glass be stained with different colors?

Yes; formerly glass windows were painted

for churches, with beautiful designs. They may still be seen in the churches and great Cathedrals of the continent of Europe, and also in England.

Are there many kinds of Glass ?

There are five distinct kinds of glass : flint glass, or crystal ; crown glass ; common window glass ; bottle, or green glass ; and flint glass. Glass is incorruptible, and may be kept without decay for centuries.

Will glass melt ?

It will, and thus the liquid glass may be moulded into different forms. Liquid glass can be drawn to a thread, curled into ringlets like hair, and woven like flax or cotton.

Is the finest glass moulded ?

No. The handsomest glass, that used for the best kind of tumblers and decanters, is cut into different figures, not with a knife, but with what is called a Glazier's Diamond.

Is glass manufactured in this country ?

It is, in large buildings called Glass-houses. The different sorts of glass contain different ingredients, the principal of which are fine sand and an alkali, either potash or soda.

How is the soda obtained ?

It was formerly procured from the ashes of *Kelp* or *Barilla*, a marine weed, but as it is

afforded abundantly by common salt, that material is now generally used for the production of soda.

Is glass used for other purposes than windows and drinking vessels ?

Yes, for mirrors and for optical glasses. A Mirror is any polished surface that reflects light; there may be mirrors of steel or of brass, but in these days glass mirrors are used.

How are looking-glasses made ?

A plate of glass, larger or smaller, is rubbed over on one side with a preparation of Mercury and Tin, the two substances forming what is called an Amalgam. This adheres to the surface of the plate, and prevents the light from passing through it. The light turned back reflects the forms of objects before the glass.

Where were glass mirrors first made ?

In Venice, of very fine glass. They were at first small, with a handle, and for the especial use of ladies. In the sixteenth century a looking-glass was unknown in a cottage; only the rich had the use of them.

Are they now generally used ?

Yes, everywhere, and are a great convenience. Mirrors of eight feet square, or larger, may now be seen in fine houses, and those of *smaller size in all houses.*

What are Optical glasses ?

Such as are used to assist sight, or Vision. These are Spectacles, or reading glasses ; the Telescope, which magnifies distant objects, seeming to bring them nearer to the eye ; and the Microscope, which makes minute objects appear larger ; some, which are invisible to the naked eye, are, by means of it, made apparent.

What is a Telescope ?

A Telescope is a series of glasses placed in brass tubes, sliding one within another, so as to be shortened and lengthened to suit the observer's eye. The larger telescopes are employed to observe the heavenly bodies.

Where were Telescopes invented ?

It is supposed that Holland claims the honor of this invention. One Zachariah, an optician, perceiving that objects seen through several spectacle glass were increased in magnitude, constructed a telescope twelve inches long, in the year 1590.

Was this a perfect instrument ?

No, it admitted of great improvement. Galileo, an eminent Florentine astronomer, constructed a telescope of greater power.

Where did Galileo die ?

He died in a delightful place called Arcetri, near Florence, in 1639. There he tended his

vines, sang sweet songs, and watched the stars until he became quite blind.

Have telescopes since Galileo's time been still better constructed?

They have. Dr. Herschel, a German astronomer residing in England about the beginning of this century, constructed a telescope which revealed stars never seen before; and one of much greater power has been made in Ireland by Lord Rosse, who is now living.

What is an Observatory?

It is a building placed on an eminence designed to hold a Telescope for the use of those who wish to inspect the Heavens. The most powerful telescopes are so large as to require a spacious and lofty room.

What is a Microscope?

It is a glass instrument, so small as to be placed in the hand. It magnifies very minute objects. In a drop of water, seen through a very fine microscope, will be perceived a number of snake-like animalculæ, living creatures, which are commonly called Infusoria. One sort called the Solar Microscope, when placed in the sun, is a magnifier of immense power.

What are Spectacles?

Glasses fitted to the form of the eye, placed in a frame of gold, silver, or steel, and worn

upon the face with design to assist Vision. Many persons who cannot see to read or write without spectacles, by the aid of them are enabled to perform whatever they might do with the best sight.

Are Spectacles an ancient invention ?

It is supposed that they were first contrived and made in the thirteenth century, about five hundred years ago.

What did people do without them ?

They were obliged to others, who could see well, to do for them what they could not do for themselves. Reading and writing, though known and practised by a few persons, were not known to many in Europe before the sixteenth century.

Why was that ?

They had no printed books, and written ones were very rare.

Besides the Stone, Bricks, and Glass in a house, are other materials needed to complete it ?

Yes ; wood for the beams, floor, doors, window-frames, and window-shutters and shades.

What kinds of wood are used for these ?

That of the pine-tree, hewn into beams, sawed into boards, and fitted into shape by

the carpenter. Other woods, as cedar, black walnut, and oak, sometimes make the ornamental parts of a house.

What is Slate-stone ?

The same sort of stone as makes the slates used at school. For these slates the stone is made smooth, and framed ; but the same stone, cut in squares and less smooth, is attached to roofs of houses.

Why is slate so used ?

Because it is not liable to take fire, and protects the roof from sparks. Plates of zinc or of tin sometimes cover roofs.

What completes a house ?

Hinges for doors and shutters, locks to fasten the doors, painting the wood-work, and sometimes papering the walls. A House often has belonging to it a Stable for Horses, and a Carriage-house.

How is a house Inclosed ?

In towns, one house is often inclosed on two sides by other houses, with a yard behind ; but in the country, where there is more space, a house and the grounds belonging to it are usually surrounded by a wall, fence, or Hedge, and is entered through Gates and Avenues.

What is a Lawn ?

A level piece of land. or a gentle descent in

front or rear of a country house, kept quite smooth, free from stones and any disfigurement.

• What is a Hedge?

A Hedge is a continued row of shrubs or bushes serving the use of a fence. The Hedge is often made of Hawthorn, and cut off evenly all along the top part. The Hedge borders fields and house-grounds.

What are our Tables, Chairs, and Bedsteads made of?

Of different kinds of wood, dearer or cheaper, as Ebony, Rosewood, Mahogany, Black-Walnut, and other cheaper wood, stained and painted.

What is Ebony?

It is an exceedingly black and hard-grained wood, susceptible of high polish. Ebony is very rare, being the production of the island of Ceylon and Madagascar, and is valued so much as often to be imitated. "As black as Ebony" is a common comparison.

What is Rosewood?

It is a beautiful wood of a dark color, much used by cabinet-makers for elegant furniture. It is brought from Jamaica and Brazil.

• What is Mahogany?

It is the wood of a magnificent tree which flourishes in Honduras, and in the West Indies.

Islands. Much of this wood is imported to the United States, and made into house furniture.

Is Mahogany much valued?

It is, but it is not so abundant as it once was : so the sawer of it often cuts it into thin sheets ; these, cut into form, are afterwards glued upon a surface of pine or some cheap wood. This process is called Veneering.

How long have these woods been used in Europe?

Only since the discovery of America in 1492. Before that time, carved and uncarved oak served for furniture.

What is Cedar?

The beautiful red wood of the cedar-tree. The most famous cedar is the Cedar of Lebanon, in Asiatic Turkey. These trees are mentioned in the Bible, and still flourish in that region. We have the Cedar.

What are some of its uses?

The Cedar belongs to the Fir family, of which the Pine and Larch trees are members ; it makes excellent posts for fences, being less corrruptible than many woods.

Has Cedar an agreeable scent?

The odor of it lasts for years, and when used for the bottom of drawers, or for shelves, *communicates an agreeable smell to linen.*

What is Black-Walnut ?

A nut-tree found in these States. It is not black, but of a blackish-brown color. The Cabinet-maker manufactures these woods, and the Carver often cuts them into ornaments upon different articles.

Of what are Beds made ?

Mattresses are stuffed with hair, and soft beds and pillows with Feathers. These are principally stuffed with goose feathers. The geese in summer shed their feathers, and while they are loose the farmer plucks the feathers, sometimes hurting the poor birds, but leaving them a moderate covering.

Do the feathers grow again ?

They do ; every year birds Moults, that is, at a particular time of the year they lose their feathers, the old being succeeded by new ones, like a new garment.

Are goose-feathers otherwise useful ?

Yes ; the long feathers of the wings being prepared, will make pens. Quill pens were formerly used entirely, but the invention of metallic pens, of gold, silver, and steel, has taken the place of them.

What is Down ?

A soft feathery substance found on the *breast* of birds near the skin. The skin of the

wild Swan is sometimes dressed with the down upon it, and is made into very pretty muffs.

Where does the wild Swan abound ?

In the northern parts of Europe and Asia, from which the down is exported to more southern countries.

What is Eider-down ?

It is fine down from the breast of the Eider-duck, a wild duck which resorts to the Shetland and Orkney Islands. These birds in great numbers make their nests upon cliffs on the sea-coast.

How is the Down obtained ?

The duck plucks her own breast, and lines her nest plentifully with the down. From these nests it is taken by those who sell it.

Of what use is it ?

To stuff muffs, or very soft pillows, or to make warm bed-covers.

Do all people have nice beds ?

No : some are, unhappily, too poor to have them ; and some in hot countries lie upon mats ; while savages repose upon the skins of animals taken in hunting. Straw beds may be made comfortable in want of better.

Besides tables, chairs, and beds, of what does house furniture consist?

Of lamps and candlesticks, of pottery-ware and glass for the table, of plate, of knives for different purposes, of forks and spoons, and cooking utensils.

Are Lamps often elegant?

Lamps are intended for reception of oil, to be burnt with a wick, and to give light in the house; and are more or less costly, according to the means of the owner.

Of what substances are lamps made?

Common lamps are made of brass, of glass, and of tin lackered over. This lacker is a colored paint, of a glossy kind, which is put upon iron and tin candlesticks, lamps, and tea-trays.

Are there more expensive lamps and candlesticks?

Yes, these are often made of bronze, or of cast-iron made to resemble bronze; many are elegantly formed and gilded. A candelabra is a number of sockets, for candles, at the end of spreading branches; the branches are fixed to a shaft standing on a foot.

What is Bronze?

It is a composition of Copper and other metal. Bronze is an ancient invention, as *is* proved by remains of antiquity.

What are Remains of Antiquity?

Very old things, taken perhaps from the bottom of wells, or found in neglected places, or disinterred from the earth where they have been long buried, or, it may be, that have been carefully preserved.

What are these things generally?

They are often small things, as lamps, drinking-cups, vases or ornamental urns, boxes, and even thimbles; besides manuscript books.

Where are these things kept?

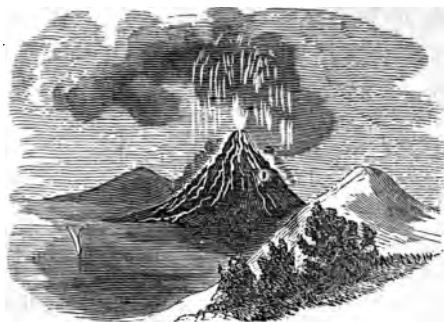
They abound in Italy; are kept in Rome, Naples, Florence, and other cities, in Museums, where visitors may see them. A museum is a collection of curious objects, kept together in spacious rooms or halls, open to the public.

Where were the greatest number of antique curiosities found?

In Herculaneum and Pompeii. These cities, not far from Naples, stood at the foot of Mount Vesuvius, and were buried by the ashes, lava, and pumice-stone, which were poured out upon them by the volcano.

How long were these cities thus buried?

Seventeen hundred years, nearly. Herculaneum and Pompeii, overwhelmed about A. D. 79, were completely hidden from view,



A Volcano.

and indeed quite forgotten. They were not penetrated until 1713, when certain workmen digging a well came upon the top of a house.

To what did this discovery lead?

The King of Naples, forty years after, employed men to dig into these buried cities, and open them. When this was done, with great labor and cost. streets, houses, shops, a theatre and baths, domestic utensils, and instruments of art and industry were found.

Is not this very interesting?

Yes, because it informs us in some measure how Greeks and Romans lived; that is, what sort of dwellings they occupied, what furniture they had, and what instruments of labor *they used*.

How could Italian people exhibit articles used equally by Greeks and Romans?

Because the southern part of Italy, once inhabited solely by Greeks, was at length taken by the Romans, and the Italian people adopted many things from the former inhabitants of that region.

What Manuscripts are remains of antiquity?

All the books which we call Classics, works of ancient poets and historians, were only written before printing was invented.

What were these manuscripts?

The books of the Bible, the poems of Homer and Virgil, the histories of Livy and Tacitus, and many others. These writings were preserved during centuries. They are now printed books.

Were many fine statues disinterred in Italy?

Yes; Michael Angelo tells how a very famous one was discovered, and seen by him when a child.

Can you relate the account?

In Rome, about 1540, some statues were discovered in a vault long shut up. Michael Angelo's father, with a friend, went to the place on horseback. The father took up the little boy behind him, and showed him

the statues. "It is the Laocoön!" exclaimed the friends, when they first beheld one group, now disinterred and greatly admired.

How did they know the group was the Laocoön?

Because they had read the narrative of the death of Laocoön and his sons in Virgil's poem, the *Æneid*. This group may still be seen in the museum of the Vatican.

What is the Vatican?

It is the name of a hill, a church, and a palace, on the left bank of the Tiber, and within the walls of modern Rome. The Vatican is, in effect, an assemblage of public buildings, and in the palace the Pope of Rome sometimes resides.

How is the Vatican divided?

Into the Papal palace, the Library, the Museum, and the Court and garden of Belvidere. The palace contains the Sistine chapel, painted by Michael Angelo, and galleries painted by Raphael. These were the most eminent painters of the sixteenth century.

Where is the Museum?

It is joined to the palace by a covered way one thousand feet in length, and contains the most beautiful sculptures in the world. Half way between the Belvidere and the *Palace* is the entrance to the grand library.

What does this library contain?

Besides great numbers of books, it contains 24,000 manuscripts in Greek, Latin, and in oriental languages. Catalogues of all these are printed, and persons who wish to examine any are sometimes allowed to see them.

What is the Right bank of a River?

When the river is descended, from its source or beginning to the mouth, the country on the right hand is on the Right bank, while that on the left is on the Left bank of the river.

What are Oriental languages?

Those spoken and written in oriental countries; those which lie eastward from Europe, as Arabia, Persia, India, and China.

What is Pottery-ware?

It is formed of clay and other matters, wrought into different shapes, and employed for different uses; as plates, tureens, bowls, pitchers, cups and saucers, and many other articles used in every family.

What is the finest of this ware?

It is Porcelain. This is made with a proportion of finely ground flint-stone, mixed *with the clay*, moulded into elegant forms.

and often gilded and painted before it is glazed and baked in a furnace.

Is Porcelain always so finished?

Not always; statuettes, and other articles made of this material, are only baked, without painting or glazing: these are of a pure white, and are called Biscuit.

What is the most beautiful manufacture of porcelain in the world?

That called Sevres China, which is made near Paris, and altogether for show and ornament. China of great beauty is also made in Dresden, in Germany, which is highly valued, and only to be procured at great cost.

What is Wedgwood ware?

It is a species of ware made in England, commonly of a blue ground, adorned with beautiful figures in relief. These, placed on a colored ground, are pure white like a cameo. It is made into vases, boxes, candlesticks, and pitchers.

Why is this called Wedgwood ware?

From the inventor, Josiah Wedgwood, who established a manufactory of it in Staffordshire, England, in the last century, in a place called the Potteries. There many thousand *men* are still employed.

Why is porcelain often called China-ware and China?

Because it appears to have been first made and painted for elegant uses in China. Old china is much valued by many persons.

Is pottery-ware used for common purposes?

Many kinds of it are very useful and cheap, as ordinary table ware, bowls, pitchers, and tea-cups and saucers; besides pots, pans, jugs, and jars of a coarse kind.

Do the Mexicans excel in this kind of ware?

They do; manufacturing such simple vessels as serve for their domestic purposes, including cooking.



A Vase, and Hour Glass.

What are Vases?

A vase means a Vessel; that is, a receptacle for any kind of fluid, whether it be made of clay, metal, or porcelain: but we use the word in a more restricted sense.

What does the word Vase commonly signify?

It means either an urn or a jar, smaller or larger, and is kept for flowers, or for ornament. Vases are commonly made of painted or unpainted porcelain; sometimes of marble, or alabaster, and also of baked clay.

What is the chief beauty of a vase?

Its form. Ancient vases, of late years, have been found in great numbers in Etruria, Southern Italy, Greece, and the Greek islands.

Where are they commonly discovered?

In burial places; that is, in tombs, or in Catacombs, and in places where it is supposed they were manufactured.

Are ancient and modern vases alike?

The modern are often imitations of ancient vases; but modern vases of marble, or alabaster, are often adorned with reliefs, cut on their surface, in what are called Classic designs.

What are Etruscan vases?

They are ancient vases, found in Etruria, a portion of Italy lying between the Tiber and Tuscany. It is supposed that many Greeks were settled among the ancient Etrurians. The vases are usually painted with *Greek figures* upon them.

How are the ancient Etruscan vases Painted ?

The ground is often of a deep brick-like red, and the forms painted on it are those of men, women, and animals ; the last are much like Egyptian figures of birds, rams, lions, and sphinxes, and of black color.

Were the Greeks known to have Potteries ?

Yes ; in a suburb of Athens was a place called Ceramicus, because potteries had once been there. In Corinth the most beautiful Vases and other ware of the sort were made.

What are Catacombs ?

They are excavations of the earth of large extent, in which great numbers of human beings have been buried. Beneath the city of Paris, in Rome, and in the island of Malta, catacombs are visited by travellers.

What are the most necessary articles in a house ?

Utensils employed in cooking, and in cleaning the house. Spoons, knives and forks, belong to our tables. Cooking utensils are pots, pans, ladles, and other articles. Smoothing-irons serve to smooth clean linen.

Of what are these made ?

Of iron, copper, tin, and brass ; besides, we use wooden-ware : pails, tubs, and barrels.

What is a Hogshead ?

It is a wooden vessel made of strips of wood called Staves, shaped and hooped like a barrel. A Hogshead contains sixty-three gallons.

With what do we clean houses ?

With brooms and brushes we remove the dust from floors, walls, and carpets. We have also window-brushes and scrubbing-brushes.

Of what are Spoons made ?

Spoons are commonly made of silver : very rich persons have gold spoons ; and some, who cannot afford silver, use plated, iron, and even wooden spoons.

What is Plated ware ?

It is first made of copper, as a copper spoon or candlestick ; then a coating of silver is spread over the copper, and by means of an Amalgam it is made to adhere to the whole surface, making the object appear as if made of silver.

Does the plating last ?

If it be thin, it soon begins to wear off ; but if it is sufficiently thick, it may last in use for many years.

What is an Amalgam ?

It is some substance which is spread over *the surface* of a metal, and then covered by

another metal, the two metals being thus firmly joined together.

What is Amalgamation ?

It is the junction and union of two different substances, which thus become one mingled or combined substance.

Can you give an example of Amalgamation ?

Plated spoons and candlesticks are the amalgamation of silver and copper, and so are the gilt buttons which are worn on men's coats ; the foundation of the button is a cheap metal, while its surface is gold.

What are Knives and Forks ?

They are the implements by which we are enabled to take animal food conveniently.

Of what is a Knife made ?

A knife, which consists of the Haft, or handle and a Blade, is made of silver or steel. Silver knives, which will not take a sharp edge, are used for paring and cutting fruit, and steel knives for other purposes.

Are there many sorts of Knives ?

Yes ; there are table-knives, pen-knives, butcher-knives, shoe-knives, and some others. These serve different uses and are all Edge-tools.

What are Edge-tools ?

They are cutting instruments, and should be *used carefully*. Swords, scythes, and sickles,

like knives, are edge-tools. Swords are kept, for safety, in a case or sheath.

What is the use of a Sword ?

It is intended to defend a man. If one wicked man should try to kill or strike another, the assaulted person, carrying a sword, might with it keep off the assailant.

What are Forks ?

They are pointed instruments, which assist us in the cutting up and eating of food. Common forks are made of pins of steel, pointed and set into a handle. Silver forks are all of one substance, the handle being extended into four or five prongs.

Are Knives and Forks modern inventions ?

Swords and knives are very ancient, but forks are modern. They were first used in England two hundred and fifty years ago, and were made of steel. Silver forks have come into use in late years.

Could meat be eaten neatly without forks ?

No; though instead of them wooden skewers were used; but the fingers were often greased by pulling apart a piece of meat, and required washing directly.

What are Carpets ?

Covering for floors, generally of wool woven in a loom, and of many colors in various figures. Eastern countries are famous for the small carpets we call Rugs,

What are Turkey Carpets ?

They come from Smyrna, have a long pile, and are of many colors and irregular figures. Some carpets are woven like velvet, as Wilton, and others like uncut velvet. Velvet has a short pile, and a hearth-rug one much deeper.

How are Carpets generally made ?

The yarn being spun, is dyed of many colors, and twisted ; it is then woven in different patterns—many yards to a piece of carpeting. When fitted to floors, the figures are joined so as to make the carpet appear to be of one piece.

Are there any Carpets without seam ?

Some small carpets are so woven ; and in France, very large and expensive ones are woven in one piece.

Are Carpets a modern invention ?

Covers for the entire floor of large apartments are modern.

When were Carpets introduced into England ?

They were first brought from France to

England in 1745. Carpet manufactories were afterwards established there and in Scotland, and soon came into general use.

How are those we use described ?

As ingrain, the least expensive kind of carpet, and Brussels and Wilton, which are more expensive. There are also imported some very costly French ones. Common carpets of good texture and appearance are made in the United States.

Are Carpets much used in France ?

Much less than in this country or in England. In France and in the rest of Europe carpets are known only in rich houses. Tiled or oak floors are reckoned to be very convenient and comfortable.

What are Tiles ?

A thin smooth sort of bricks made in form of diamonds and hexagons, which are laid into floors of rooms and passages, and which look very well.

What is Oil-cloth ?

A piece of canvas stretched is painted in many colors and various figures, entirely concealing the canvas. When perfectly dried, this is laid upon room and hall floors.

What is Drugget ?

It is a thick woollen stuff, stained on the

surface in various patterns. Being cheaper than carpeting, it is often used to cover the carpet in order to keep it clean.

Do poor people use carpets ?

Only those who can afford them use them.
A clean board floor is very comfortable.

Did people cover floors when they had no Carpets ?

They often strewed their common rooms with sand, and in some past times spread Rushes upon the floors, renewing them when soiled and broken.

Are Time-pieces kept in houses ?

They are ; these are more or less elegant and costly, being made of wood, silver, and gold.

Are Time-measurers very ancient ?

They are, but not very perfect ones ; the oldest mentioned in history are the Sun-dial, and the Clepsydra, which was used by the Romans.

What is meant by the phrase, "What o'clock is it ?"

It means, What hour of the day is it as shown by the clock ? The space of time between sunrise and sunset is called a Day, and that between sunset and sunrise is a Night.

How are Day and Night divided ?

They are divided into twenty-four Hours ;

each hour into sixty Minutes, and each minute into sixty Seconds. Three hundred and sixty-five days and six hours make a Year.

In how long time does the Earth move round the Sun?

In a year. Every twenty-four hours the Sun rises and sets, but not at the same hour; every day when the sun is at the highest point in the heavens between rising and setting, it is Noon.

Why is that hour called the Meridian?

Because the Sun is in the middle of his course. The sun does not move, but the earth moves. We have rolled round into his light when the Sun seems to rise; we have rolled away from his rays when he appears to have departed from us.

Can you understand that?

Yes: when I turn from the light I cannot see it, it does not shine upon my face; but when I turn round towards it, I see it plainly; just so when we on our side of the earth are turned from the Sun, we do not see his light, he appears to have gone from us; when we are again turned to him, we see his light once more.

What is the Horizon?

It is that part of the heavens which seems,

in a circle around us, to meet the earth. The rising sun comes into view at the Horizon at sunrise, seems to mount during several hours to noon-time, or to the meridian, and then descends to the horizon and disappears.

What is meant by Points of the Compass ?

What we call East, West, North, and South, which are properly points in the Sky, or Heavens.

Does the Sun rise in the East ?

The Sun rises exactly in the East and sets in the West only on two days in a year ; these are called the Equinoxes ; the two days are the twentieth of March and the twentieth of September.

How are the Equinoxes distinguished ?

That of the Spring is called the Vernal Equinox, and that of the autumn the Autumnal Equinox. The days and nights are at those seasons each twelve hours long. The Sun, from March twentieth to June twentieth, rises earlier and earlier, more towards the south, giving more hours to the day, and setting further to the north of East. The twentieth of June is called the Summer Solstice, but from that day the sun rises and sets at a later hour. .

What is the Winter Solstice?

The twenty-first of December; that is, the shortest day in the year. After that day the sun rises earlier and earlier, and the days become longer and longer, until the Summer Solstice.

What is a Sun-dial?

It is a piece of metal marked with the twelve hours of the day like a watch-face, and set fast on a post where the sun's rays will fall on it from rising to setting.



Sun-dial.

How is the hour of the day shown by the Dial?

Into the face, or plate, a piece of metal of a *triangular* shape is so fixed, that when the sun

- shines the shadow falls exactly on the figure, expressing the hour: as the sun moves, or seems to move, the shadow passes from one hour to another.

What is the Index, or Time-shower, called ?

It is called the Gnomon. An Index is a Pointer, that instrument which Indicates or shows something. The minute and hour hands of a clock are the Indices of the time of the day.

What was the Clepsydra ?

It was called a Water-clock: water was placed in a vessel with a small hole in the bottom; through this the water within the vessel ran slowly into one beneath.

How did that show the hour ?

It did not show it exactly unless filled at the Meridian hour. The inside of the water-vessel was marked at different distances; the water would sink gradually from mark to mark.

How was the hour counted ?

If the water sunk from one mark to the next in ten minutes, the distance between the marks being alike, it would fall to another mark in ten minutes more, which, added to the former fall, would make twenty minutes. *Thus the outflow of the water would show*

how much time had elapsed since it began to fall.

Did the Clepsydra resemble an Hour-glass ?

It did : only in the Hour-glass Sand is used instead of water. The Romans used the Clepsydra.

When were modern Clocks invented ?

The Italian poet, Dante, mentions the striking of a clock ; he died in 1321, therefore clocks might have been in use in the thirteenth century. A public clock is known to have been placed near Westminster Hall, London, in 1288.

Is any thing known of the first Clock-maker, or Inventor ?

Nothing whatever ; the first watches were made in Nuremberg, in Germany, and were much larger than those in present use. They were sometimes known as Nuremberg eggs.

What are the principal parts of a Clock ?

The Wheels and the Spring within ; the Pendulum, the Dial or face, the Index, the Crystal, and the Case. The Dial is often of white porcelain, with figures upon it, at equal distances, representing the hours from one to twelve, and the minutes also. ¶

What is the Watch-case ?

It is the receptacle of the other parts of the

watch, and is either of gold, silver, or some inferior metal gilt. The face is covered with the crystal, made of glass in a convex form, which shuts into the case.

Will the Clock and Watch keep in motion without any operation to produce such effect ?

No : a Time-piece contains a spring wound round a cylinder which is uncoiled in a certain number of hours or days, if the watch is in motion. This must be wound anew to continue the motion of the clock or watch.

How is this done ?

By means of a little instrument called a clock or watch Key.

Are there a great variety of Clocks ?

The construction of all is nearly the same. Some are made with more care than others, and some are more elegantly ornamented. The people of the United States use wooden clocks, so cheaply made that all can possess one.

What science is employed in Watch and Clock making ?

It is called Horology, and the Clock-maker is an Horologer. Chaucer, an English poet, called a Clock an " Orloge," nearly five hundred years ago.

Where are the best Clocks and Watches made ?

In France, and in Switzerland, at Geneva

Are metals brittle?

A stone, beaten with a strong hammer, called a Sledge, will fly into many fragments: the stone is Brittle. A piece of metal, when beaten, spreads under the hammer.

What is that softness of the metal called?

Its Malleability. A piece of gold may be spread out to a leaf thinner than the thinnest paper.

What is Ductility?

It is the property of being drawn out to Wire, like a thread, as the bell-wire. When a mass of metal, with a proper instrument, is drawn out to wire, it does not break off, but one part adheres to another all along the line.

What is this property of holding together called?

Cohesion, or Tenacity. If this property did not exist in bodies they would fall apart like sand or meal, without taking any form whatever.

What is Fusibility?

It is capability of being melted. Placed over a sufficiently powerful fire, a solid metal becomes fluid: it is melted, and may be turned into a mould, taking the form of *it* when cooled.

Why does not the melted metal melt the mould?

Because the mould is either made of Clay or of Platinum, which cannot be affected with the heat of fluid metal.

How can you sum up the character of a metal?

It is a heavy, opaque, brilliant, malleable, ductile, and fusible mineral.

In what condition is a metal found in the earth?

In the state of an Ore. An ore is a mixture of soil, stones, and any metal they may be combined with.

How is the metal detected in the ore?

Metals having once been discovered in any place, Miners dig there for more, and soon learn if the earth dug into contains iron, gold, or any other metal. The place in the earth containing metals is a mine.

When the ore is dug up, how is the metal obtained from it?

By many processes: chiefly by fire, which separates the metal from other substances, and makes some into bars, and the most valuable into squares or oblong pieces, of a certain weight, called Ingots.

What science comprehends the knowledge of Metals?

Mineralogy. The Mineralogist not only *understands* the nature of metals, but of all

known minerals; the coal burnt in our grates; the rocks that lie around our dwellings, and often contributing to make them; and the ores, which, being purified, furnish both our necessities and luxuries.

Who understands the working of Metals?

The Metallurgist. He can assay or prove the quality of metals, and show whether they are Adulterated; that is, mixed with any inferior metal; as whether an ounce or two of lead is mixed with a pound of silver.

Does owning a Mine make a man rich?

All mines cost much to work them: many laborers must be employed and paid to dig the ore, and to refine the metal; and the mine may be far from any place of sale, so that the metal must be transported at great expense.

What effect has this outlay of money?

When the metal is sold, all which it has cost must be taken out of what the purchaser pays for it. What is paid out is taken from the Profit of the mine-owner. If the profit be large, the owner of the mine will be rich.

Can you enumerate the chief metals?

I can: they are Gold, Silver, Copper, Iron, Lead, Tin, Quicksilver, Platinum, Zinc, Antimony, and Arsenic.

Will metals combine with each other?

They will; the mixture is called an Alloy, but the inferior metal is commonly called the alloy of the superior. Brass is composed of an Alloy of Copper and Zinc.

What is German Silver?

It is an Alloy of copper, zinc, and Nickel. Bronze contains ninety parts of copper and ten of tin. Type-metal consists of three parts of tin and one of antimony. Pewter is composed of tin, antimony, copper, and bismuth. Gold and silver coins are alloyed with about one-twelfth of copper, making them harder and more durable.

What is the most valuable metal of all?

Iron, for its uses, and gold for some peculiar qualities.

What are these?

Gold is the heaviest of the metals, being about twenty times heavier than the same bulk of water. A tea-cup filled with gold would be as heavy as twenty tea-cups of water.

Is gold remarkably ductile?

More so than any metal. A single grain of gold can be drawn out to five hundred feet of wire. Gold never tarnishes, nor rusts in open air. It will retain, in every situation, *its bright yellow color, unstained.*

What is Gilding?

It is a superficial covering of Goldleaf, applied to picture-frames, lamps, vanes, or crosses upon church-spires, and to many other things.

What are "golden sands?"

By golden sands, people mean sands containing small particles of gold, which are brought down by rivers. The gold known to the ancients was chiefly obtained from the sands and gravel found on the banks of rivers.

What rivers were famous for these sands?

These were, chiefly, the Pactolus and Phasis, in Asia Minor; the Po, in Italy; the Tagus and Douro, in Spain and Portugal.

Is the use of Gold ancient?

The use of gold is very ancient. We read in the Bible of the golden candlestick, used by the Jews in their worship.

Is gold abundant at the present time?

More so than in any former age. Russia, California, and Australia afford immense quantities.

When was the gold of California first discovered?

It was first seen there by the present inhabitants, in the gravel descended from a *mill-stream*, a tributary of the Sacramento

River, in 1848. People began then to dig for gold in that neighborhood, and have since obtained much of that precious metal.

Has the productiveness of the California gold continued?

Gold has continued to be found abundantly in California.

When was gold discovered in Australia?

In 1850; an English gentleman, thinking the ground resembled that of California, sought for gold in Australia, and found it in no less than twelve places. Since then, gold has been dug in extensive districts, and much of it has been exported to England.

In what part of Russia is gold found?

Both in European and Asiatic Russia; on the slopes of the Ural mountains, and south of Siberia.

Is there gold in Africa?

Yes; one part of Africa is called the Gold Coast, and some gold is imported from there to England every year. The richest African mines are situated thirty miles south of the river Senegal.

Do hot countries afford gold?

Cold and temperate climates, as well as *warmer regions*, contain gold; the country

may be flat or mountainous, inland or upon the sea-coast.

Is gold easily melted?

The fusion of gold is effected without very strong heat: neither that nor silver can be Calcined; they are, therefore, called Perfect metals, and often Precious metals.

What is meant by Calcining?

Burning to powder. When lead is melted, scales of it will be found on the surface of the fluid metal. This is calcined lead. The whole quantity might be burnt to Calces, leaving no lead at all.

What is Silver?

It is a perfect metal, but much lighter than gold, weighing but eleven times as much as water. Silver is white, but susceptible of a high polish. Many useful and elegant things are made of silver, as forks, spoons, pitchers, and drinking-cups.

Is the use of silver ancient?

It is; "Apples of gold in pictures of silver," meaning some ornamental work, is mentioned in the Bible.

What is meant by a silver sound?

It is a gentle ringing sound, like that of a small silver bell. Such an expression is *Figurative*.

What country affords much silver?

Peru, in South America, contains rich silver mines, as does Mexico, in North America. The mines of Potosi, in Peru, were the richest in the world.

How were these mines discovered?

It is related that Diego Hualca, an Indian hunter, 1545, pulling up a shrub, drew up with its roots a piece of silver. The metal was already known in that country, and the hunter knew something of its value.

Did Diego become the proprietor of the mine?

The Spaniards were owners of the country, and would not suffer the poor Indians to own any thing. The mountain containing the silver was soon excavated, and vast supplies of that metal have been taken out of it.

What are our American coins made of?

Of gold, silver, and copper. The Eagle, or ten-dollar piece of money, the half-eagle, and quarter-eagle are of gold; the Dollar, half-dollar, quarter-dollar, the ten-cent piece, the five-cent piece, and the three-cent piece are of silver; the Cent, one hundred of which are a dollar, is of copper.

What is Platinum?

Platinum is a perfect metal, as indestruct

ible as gold, of a whitish-gray color, and very heavy. It is exceedingly malleable and ductile. Its chief use is to make such vessels for the chemist as shall neither break nor melt in the hottest fire.

What is Quicksilver?

It is a metal, white, like silver, but in a fluid state; being poured out, it will run about in little globules, or round drops, like water; mixed with gum, oil, or fat, it loses its property of running about.

Is quicksilver useful in combination?

Yes; for, mixed with tin, it silvers looking-glasses, and with gold, it will gild over a metallic surface.

How is this done?

By heating the gilded article; buttons, for instance. The quicksilver being very Volatile, flies off, and the gold adheres to the surface intended to be gilt. Quicksilver is fifteen times heavier than water.

Is quicksilver ever used for Medicine?

It is sometimes so used, being prepared with some mixture of drugs. It is then called Mercury. Such are called Mercurial medicines.

Are mercurial medicines hurtful?

They are injurious, unless taken with great

care. One effect of the use of these medicines is loosening the teeth, and causing great spitting.

What is this called ?

It is called Salivation, because the fluid of the mouth is Saliva, often called Spittle. Too much Saliva, caused by taking medicine, creates Salivation. This is supposed to relieve or cure some diseases, but in general it is hurtful.



A Retort.

Is Quicksilver found in all parts of the world ?

It is found in Spain, Austria, some parts of South America, and most abundantly in California. Quicksilver mixed with Sulphur makes a fine red paint called Vermilion. This substance is also called Cinnabar.

Is Cinnabar ever found ready-made in the earth ?

It is so, and the quicksilver can be extracted

from it. The richest quicksilver mine in California is Forbes's mine, sixty miles from San Francisco. Quicksilver assists in separating gold from sand, and from Quartz, a mineral which contains gold.

How does the Quicksilver separate the Gold ?

Quicksilver, mixed with such sands as contain gold, or with the quartz which contains gold, may be mixed with this quartz pounded up. The whole mixture being then shaken, the quicksilver attracts to itself every particle of the gold, and this Amalgam falls to the bottom of the vessel.

How are the gold and quicksilver then separated ?

By applying to the Amalgam a furnace-heat the quicksilver flies off into a receptacle prepared for it, and the gold and silver are then free of each other, and Pure.

What is meant by the word Pure ?

Consisting of a single substance: as flour alone, before it is mixed with water, milk, or eggs, is Pure.

What is Purity in regard to the person and mind ?

Purity in garments means clothing without soil or stain; Purity of heart means innocence, truth, and goodness in the soul, without any feelings of ill-will, or any intention to deceive.

What is Copper ?

Copper is a very useful metal of a reddish-brown color, as may be seen in a new cent. It is but eight times heavier than water. It is easily wrought into sheets, or into cooking and other vessels.

Does Copper easily rust ?

It does ; and the rust of it, green and having a disagreeable odor, is called Verdigris. Copper in sheets is often used to cover the bottoms of ships.

Why is Copper so used ?

Because it is smooth, and passes easily through water, and also protects the wood which it covers from certain worms that would else bore into it.

Are Cooking Vessels made of Copper ?

They are, but are generally lined with tin : if any acid like vinegar is put into an untinned copper vessel, it makes the rust of copper, which is a poison. Poisons taken into the stomach create sickness, and sometimes cause death.

How is Copper converted to Brass ?

By mixture with Zinc, another metallic substance. Brass is of a golden yellow color, and when highly polished is very brilliant. Copper bears hammering, but brass is not *malleable*, and must be differently wrought.

What Countries afford Copper ?

Some parts of England and Wales. Copper is said to exist abundantly on the borders of Lake Superior, in the United States.

What is Zinc ?

Zinc is a bluish-white metal found often mingled with sulphur or carbon. Carbon is the same substance as Charcoal, but often so finely mingled with other matter that it cannot be seen. A substance containing carbon is called a Carbonate, as Zinc and Carbon are a Carbonate of Zinc.

What is this Carbonate of Zinc ?

It is Calamine, and is found abundantly in the State of New Jersey. Zinc may be rolled out into sheets.

For what is Zinc used ?

Zinc is extensively used for gas-pipes, for roofing of buildings, and for lining of refrigerators. It is lighter than lead, cheaper than copper, and less liable to rust than iron.

What is Lead ?

Lead is a blue metal, so soft as to rub off on paper, and to be scratched with one's nail. It is highly malleable, but not sufficiently ductile to admit of being drawn into wire.

Is Lead subject to artificial changes ?

Yes : it can be made into White lead, used

by painters ; Red lead, also a painter's color ; and Litharge, a preparation of it used in the arts.

What are the Calces of Lead ?

Calces is the plural of Calx. Calces of lead are such particles as fire causes to rise on the surface of lead, the whole substance of lead being convertible to Calces by continued burning. A certain portion of lead enters into the composition of the finest glass.

In what countries is Lead found ?

Lead is more in use than any metal except Iron. It is found abundantly in England, Wales, and Scotland, and at Galena, in the State of Illinois. Thick bars of lead intended for sale are called Pigs.

What is the Worker in lead called ?

He is the Plumber ; the Plumber makes the leaden pipes which convey water to our kitchens and baths, and also what are called the Waste pipes, which carry water out into the drain or sewer of houses.

What is the Sewer ?

A Sewer is a channel dug out and stoned on the bottom and sides, below the surface of the ground.

What is the use of the Sewer ?

A Sewer, besides carrying off superfluous

water, takes away many refuse substances which might else injure the health of families.

What is Tin ?

It is a white metal, which, when untarnished, looks like silver ; it is contained in inexhaustible mines in Cornwall in England, and in the peninsula of Malacca.

Were the mines of Cornwall known in ancient times ?

They were ; for the Phœnicians traded with the Britons, the ancient inhabitants of England, before the birth of Christ. These Phœnicians came all the way from Western Asia through the Mediterranean.

What are the peculiar qualities of Tin ?

It is softer than gold, slightly ductile, and so malleable that it may be made into a Foil only one-thousandth part of an inch in thickness.

What is Foil ?

Foil, of gold, silver, or Tin, is a thin sheet of either metal. Tin foil is so thin that one thousand leaves of it laid one upon another would form a thickness of only one inch.

Is gold leaf thinner than tin foil ?

Gold leaf is so thin as to require 28,200

leaves to make an inch of thickness, and silver foil requires 10,000 leaves.

How is Tin used ?

Tin is used for the coating or lining of copper vessels, and spread upon sheets of iron, forms what is called Tin Plate. These plates, joined together, make many useful things.

How are these plates joined ?

They are united in seams ; these seams are joined by a mixture of melted lead and tin called Solder. This is poured into the seam, and, when cooled, strongly cements the pieces of tin.

Have you seen any thing made of Tin ?

I have seen Boxes, Kettles, Candlesticks, Pails, and Pans.

What is Iron ?

It is the metal most useful of any, being found in almost every country, and used for many purposes. It makes Bars, Pick-axes, Spades, Ploughshares, Hoops, Spikes and Nails, and many other things.

In what sense is Iron the most valuable of metals ?

Because it is of the greatest service, and a *benefit to all persons in all countries that*

know the use of it. The implements of the miner, the farmer, the carpenter, the mason, the smith, and the shipwright, are made of Iron, and with Iron.

Of what use is Iron to Travellers ?

Roads laid down with Iron rails are traversed by the Iron wheels of enormous carriages in long trains, bearing along thousands of passengers daily, with almost the speed of a bird's flight.

Of what use is Iron at Sea ?

Machines that propel great sea-boats are made of Iron, and so are the anchors that stay them in storms, the needles that guide them and the springs of those Chronometers that measure their time.

How is Iron useful in our houses ?

It forms part of our fire-places, our stove and grates, thus aiding in the cooking of food and in warming our persons, in all our cutting instruments in daily use, and even affording medicine to our ailments.

How is the medicinal quality of Iron manifested ?

Chalybeate Springs, which contain Iron, relieve invalids, and steel-dust is given as Medicine.

Has Iron any thing to do with Learning ?

Yes; it makes steel pens, is part of the

coloring of ink, and also forms parts of the printing press : thus by means of Iron Knowledge is scattered all over the world.

What is Specific Gravity ?

The attraction of the Earth to any body or substance on the earth.

How is Attraction apparent ?

• By falling of things to the earth ; they do not rise into the sky ; the earth draws all things to itself, except gases and vapors which are lighter than air.

What is Weight ?

It is Specific Gravity. If gold is heavier than iron, it is so because it is less porous and more solid, and is drawn with greater force towards the earth. The lightest article, a feather, would fall to the ground if it were not kept up for a time by air which supports it.

Is Iron a heavy metal ?

It is one of the lightest, being only seven or eight times heavier than water. It is the hardest of metals, and the most elastic, or springy ; it is very difficult to break, and is *not easily fusible*.

Are there different modes of preparing Iron for use ?

There are Forged iron, Cast iron, and Steel, very differently wrought and different also in their respective uses.

What is Forged Iron ?

Iron, when first melted from the ore, is hard and little malleable ; but when heated red-hot, and beaten with the hammer, it becomes ductile and Flexible. The horse-shoe is forged iron.

What is Cast Iron ?

Cast Iron is that which is melted and poured into moulds of any shape. Cast Iron, such as kitchen vessels, is brittle, and should not be handled carelessly.

What is Steel ?

Steel is a preparation of Iron. The best iron, that out of which all mixture of other matter is expelled, is Wrought Iron. This wrought iron, with addition of Carbonic matter, is made into Steel.

How is this done ?

Bars of wrought iron are laid into powdered charcoal, and then both substances are put into boxes filled with sand, and closed tight. The contents of the boxes are kept in an intense heat for ten days, and when opened, the iron is found to be Steel.

What is made of Steel ?

This substance is made into clock and watch springs ; into knife-blades, scissors, and needles ; into chisels, and many other mechanical instruments.

How do you know Steel ?

By its brilliancy when polished, its peculiar color, and its hardness.

Is Steel elastic ?

It is elastic, as the watch-spring, when made to be so ; but brittle, as a penknife, or the points of scissors, if made in a particular manner.

Do Iron and Steel rust easily ?

They do, when not kept quite dry.

What is Loadstone ?

It is an ore of iron, sometimes called the Magnet. The Magnet will draw or Attract iron and steel to itself. It will thus draw up a needle or a key to itself, and adhere to them, until it be forced off.

What is the Magnetic Needle ?

It is a Magnet made into a Needle, and fastened like the hand of a dial to the face of the Mariner's Compass. This magnetic needle, fixed in the middle by a rivet, will al-

ways point one end to the North exactly, and the other to the South.

Can the magnetic power be communicated ?

Yes : by rubbing a magnetic needle and one not magnetized together, the latter may receive the magnetic property, and become also a Magnet.

What is the world we live in ?

It is the globe of the Earth, one of the Planets, receiving from the Sun Light and Heat; itself formed of land and water, and surrounded by an Atmosphere which all animals Respire or breathe.

Is the earth fitted to mankind ?

It is exactly contrived to support the life of man, and all other living beings. It is formed of mineral substances adapted to his wants; produces vegetables on which he feeds; and animals that assist his labor, and also furnish him with many of the necessities of life.

What science describes the interior of the Earth ?

Geology. A Geologist is one who examines the different soils of countries, the rocks above and below the surface of the ground, the form and height of mountains, and the *Coasts* which border on the sea and lakes.

Why is all this done?

Because men have in their minds a principle called Curiosity. Curiosity is the desire of knowing more than we know at the present moment.

Do all persons possess Curiosity?

All persons are not geologists, all do not desire to possess some knowledge of the depths of the earth, but all desire to know something.

Do infants show signs of curiosity?

Children of all ages show curiosity; they all try to learn something, not from books, but from objects around them.

What is the use of Curiosity?

If we had no desire to acquire knowledge, we should be like the lower animals; like the cattle, or the birds of the air. We should be no wiser, at twenty years of age, than when we were one year old.

What is Experience?

Experience is what we have seen and known, what we can remember and think of.

Of what use is Experience?

Experience tells us what to do, and what not to do. If I burnt my finger by thrusting it into the candle-flame, I should know that fire burns, and should not do so again. *Experience* would teach me not to play with fire.

Is there any other mode of obtaining knowledge besides experience?

Observation is part of experience. To observe, is to look carefully at what is around us: to listen to what we hear, to use all our senses, besides attending to Instruction, are means of gaining knowledge.

What is Instruction?

Instruction is the pains taken by the well-informed to afford knowledge to the ignorant.

Who are the Ignorant?

Infants are ignorant; they know nothing till they live long enough to observe and be instructed.

Are grown persons ever Ignorant?

Some grown persons know much more than others, as some are wiser and better than others. Some persons know a great deal, and some very little.

Why do many remain in Ignorance?

Because they have not been instructed when young; but often because they have hated Instruction, and have taken no pains to acquire knowledge.

Besides Observation and instruction from others, is there any way to obtain knowledge?

Yes, by reading and study. Wise and learned men have written out what they *know* for the benefit of others, and by means

of printed books we can learn what they would teach.

Can we acquire knowledge at any time of our life?

If we begin while young to acquire knowledge, because we love it, we shall gain more the longer we live.

But may we not begin learning when we are old?

Then we have not Leisure; that is, time enough to learn much. To him only who knows much, much more will be given, late in life; then, for the most part, the ignorant must remain ignorant.

How is that?

We are so made that Habit, after we have been long in the world, inclines us to know only what we already know, and to do what we have done.

What is Habit?

.It is Use or Custom: habit is what we have done for a long time; taking breakfast every morning is a habit.

Are habits both good and bad?

They are; good habits make good people, and bad habits make men, women, and children bad, if they will not correct them.

If we have formed bad habits, can we alter or correct them?

We are sometimes able to alter bad habits.

we can always improve, or grow wiser and better, if we try very much; but it is best to form good habits at first.

What are two very bad habits?

Idleness and Ignorance: it is only by determining to exert ourselves, and by striving to learn, that we can obtain any considerable knowledge.

Has the Earth always been in its present state?

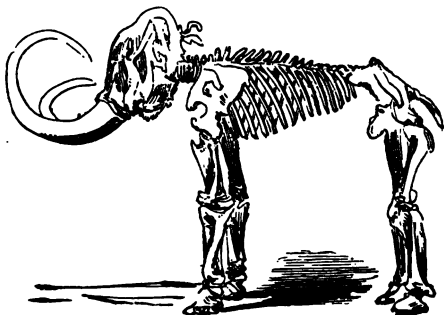
Geologists presume, that previously to the creation of Man, the globe of the earth was in a different condition from the present. Sea-shells are found on mountain tops, and Organic remains of animals of Extinct Species have been found beneath the surface of the earth.

What are Extinct Species?

Animals that have existed, but which no longer exist; the Mastodon, or Mammoth, belongs to an extinct species.

What are Organic remains?

Organic remains are Fossil bones, that is, buried bones, found beneath the surface, and sometimes disinterred from the ground. Entire skeletons of sea-animals have been found in the earth near sea-coasts, thirty feet in length, resembling the lizard in structure.



Skeleton of a Mammoth.

What name has been given to these remains ?

That of Sea-lizard, and sometimes Ichthyosaurus, a Greek name. Other remains of animals once belonging to the sea, and equally large, have been found imbedded in earth, but are never seen living.

Are there other proofs of Changes in the earth ?

Many, and one especially: Coal, though called a mineral, was once a vegetable. Great forests thrown down, vast quantities of trees upturned and driven by floods of water, were buried by soil forced upon the top of fallen trees and plants; they lying beneath it, through countless ages, until turned into Bituminous and Anthracite coal.

How is this known ?

Because marks of fern leaves are found in pieces of coal broken open, and foot-prints of birds made when it was soft. The coal being Analyzed, or accurately examined, is found to consist of the same substance as trees are made of.

What is that substance ?

By burning wood, but not to ashes, we obtain charcoal, or Carbon, and thus learn that the matter of wood-coal and mineral-coal is the same.

What is the effect of burning Charcoal, or any coal, in a close room ?

It will cause the death of any person breathing the air of that room. It produces Asphyxia; that is, its gas, Evolved in burning, if respired, will occasion a convulsion of the air-passages : they who imbibe this gas soon fall into stupor, and die.

What is inferred from manifest changes in the Earth ?

That once it was not fit for the habitation of man, and that no man existed then upon this planet ; but when certain changes had taken place, by the extinction of enormous animals which would interfere with human beings, God having prepared the earth by other alterations for the human race, bestowed *it upon them.*

How is the structure of the earth described ?

Upon its surface is the vast bed of the ocean, covering two-thirds of the earth; the remainder being solid earth, such as we stand upon, is divided into continents and islands.

Are these flat surfaces ?

No; they contain mountains, plains, and great rocks, and are watered by lakes and rivers. The Centre of the earth is presumed to be Fire, called the Central Fire

What does the surface of the earth principally consist of ?

Its surface consists chiefly of the soil called Vegetable Mould.

How is Mould formed ?

By the decay of vegetables. When God fitted this world for his creature Man, he commanded that the earth should "bring forth grass, the herb yielding seed, and the fruit-tree yielding fruit;" "He spake, and it was done."

What has been the effect of this Fiat of the Almighty ?

Vegetables thus ordained to exist, to grow and flourish, have continued so to exist, and to be renewed. Every year the leaves fall from most trees, and lie upon the ground; grass grows up, is cut down, and springs again; wheat, corn, and all fruits ripen, and then return in some way or another to the soil.

What has become of all these vegetable substances in six thousand years ?

They have partly composed vegetables again ; but a great part has accumulated, that is, Increased, layer upon layer, in vegetable mould, which lies under our feet to considerable depth, wherever vegetation has been going on for ages.

Is there no more material substance now than there was thousands of years ago ?

Not any more. The Elements, certain substances which make the whole planet, have changed their form and place innumerable times, but the Quantity of them is the same still.

Can you give an example of this ?

Yes ; primitive trees contained Carbon ; some of these trees were turned to Carbon in coal ; this Carbon may be burned and turns to Carbonic gas ; Carbonic gas enters into plants when they are growing, and with other substances makes new vegetables and wood.

How does water continue the same in quantity ?

The water of the great ocean evaporates in Clouds ; the Clouds fall in rain ; the rain forms springs and Rivers ; the Rivers run into the Ocean, and so continue, exhaling and returning to the great reservoir.

Do we not use up much water ?

We use it, but all that water exists afterwards : mixed with foul substances, it is thrown out, but this water all evaporates, being quite pure, and mingles in the atmosphere with other vapor.

What is Annihilation ?

To Annihilate any thing would be to destroy it entirely. If I throw a letter into the fire, I annihilate the writing, but I do not annihilate the paper, it exists still in ashes ; the form of the substance changes, the matter of it remains.

What is the Perpetuity of Matter ?

Its quality of continuing when it appears to be broken, decayed, or injurious. It will then take new and beneficial forms.

Can Men descend very deep into the Earth ?

By boring, they may descend some hundred feet below the surface. This is done to obtain water. The well, into which water flows from springs deep in the ground, may be made deeper or shallower.

Have any very deep wells been dug ?

There is a sort called the Artesian well, dug in a low place, between two eminences at a distance from each other : such a well is dug down often some hundred feet. The

laborers find the earth wariner and warmer as they descend.

Why does not the Central Fire explode, and burn up all things far and near?

As a house has chimneys that conduct smoke from the fire of the hearth, so the earth has its Vents, or openings, by which the Subterranean fire is sometimes thrown out. These are Volcanoes.

How are volcanoes formed?

They are generally mountains, hollowed atop into a vast bowl or cup, called the Crater, through the bottom of which the fire is forced up with great violence.

Does nothing but Fire comẽ from the Crater of a Volcano?

Yes, certain substances forming the interior of the passage through which the fire is forced are thrown up by it; ashes, mud, pumice-stone, and a peculiar substance called Lava.

What does Lava resemble?

When poured out of the Volcano, it is in a fluid state, as thick as honey; but when it is cooled, it becomes so hard that it may be wrought into boxes and small articles.

What is lava composed of?

Of certain mineral substances, including a

portion of Iron, all in a state of fusion when first Ejected.

Do volcanic Eruptions occur frequently?

The Eruptions often happen at distant intervals of time, but warning is usually given by abundance of smoke from the crater, and often by earthquakes.

Where do volcanoes commonly exist?

They are found commonly in the neighborhood of the sea, or of lakes. Many volcanoes are now extinct, though they are known to have existed, by lava and other volcanic matter lying about them.

Are there many volcanoes in the world?

Volcanoes, still subject to eruptions, are found in almost every country. In Italy, and the neighboring islands, are several, both active and extinct.

Which are the most considerable?

Mount Vesuvius, near Naples, and Etna, in the island of Sicily; besides smaller ones in different parts of Italy, and in the Lipari islands.

What is said of Volterra, a town in Tuscany?

In the distance from this town, some hundreds of miles from Naples, is Monte Catino, famous for its copper mines; and in the same direction is seen the smoke of a volcano.

no. Almost all Italy is said to be of Volcanic formation.

Are there volcanoes on the Atlantic islands?

There is a volcano in Teneriffe; the mountain is called the Peak of Teneriffe. Mount Hecla, in Iceland, is a famous volcano.

Are there volcanoes in Asia?

On the coast of the Persian gulf there are volcanic mountains, some active, and others inactive. There are similar ones on the Red Sea coast; some near Smyrna, and others among the Caucasian mountains.

Are volcanoes found on the western continent?

Not in the Atlantic States, but the Rocky Mountains exhibit extinct volcanoes. California and Mexico contain many. These are; one in California, five in Mexico, and twenty in Central America.

Are there Volcanoes in South America?

There are some of prodigious grandeur, and frequent activity. Only one is active in Peru, but there are nineteen still subject to Eruptions; one, called Villarica, burns almost constantly.

What are hot Springs?

Warm and hot springs of water, heated by subterranean fires, are in some places

thrown up in great jets; those called the Geysers, in Iceland, are the most famous.

Can any use be made of hot springs?

They serve in some places for bathing, and the Icelanders can cook their food in the boiling water of the Geysers.

Are Volcanoes very destructive?

They often are so, as appears by the history of Herculaneum and Pompeii; those cities which lay hidden near Vesuvius for seventeen centuries.

Do people ever build again upon ground that has been thus overwhelmed?

They often build on the borders of it; because the place is convenient, because the neighboring soil is fertile, and because they hope an Eruption will not soon occur again.

What are Earthquakes?

An earthquake is a trembling, or shaking, and opening of the earth: it is generally preceded by a rumbling noise like thunder. Eruptions of volcanoes are often accompanied by earthquakes.

Is the cause of earthquakes known?

It is believed that they, like thunder, are caused by electricity under ground, and also by *subterranean* fires.

Are all earthquakes of like violence?

No. In South America, particularly in Chili, where Earthquakes most frequently occur, the shock is often so slight as to be called the Tremor, or trembling. These tremors, at some seasons, happen there almost every day.

How long does the shock of an earthquake last?

It lasts from three seconds to three minutes. When several shocks succeed each other, the first is the most violent, while those which follow diminish in force.

Are earthquakes ever very alarming?

Nothing can be more awful than the most violent earthquakes; the earth heaves up and down, the walls of houses are thrown down, often upon the family within, and the noise and danger completely bewilder the people generally.

What becomes of human beings in an earthquake?

Some are killed by the falling of buildings, others by openings in the earth—Fissures or great cracks, which open for a moment, and then close over unfortunate persons who may have fallen into them.

Are Earthquakes known in all countries?

They have been felt in Europe and in Asia, but more often in South America.

When did the great Earthquake of Lisbon occur ?

In 1755. This earthquake almost destroyed the city of Lisbon; thirty thousand persons perished in it, and a great number of houses and churches were laid in ruins.

Is Sicily subject to earthquakes ?

Both Sicily and Calabria, and the neighboring part of Italy, are subject to earthquakes; the town of Messina was overthrown, and great numbers were killed, about sixty years ago.

Have very destructive earthquakes occurred in South America ?

Yes; some of the countries on the Caribbean Sea, besides Peru and Chili, have been afflicted with earthquakes. The town of Caraccas has been twice destroyed by them; forty thousand persons are supposed to have been killed by earthquakes on the high lands of Peru in 1797.

Are the United States subject to earthquakes ?

No; this happy country is blessed with an agreeable climate for the most part, and is exempted from Volcanic eruptions and from earthquakes; though very slight tremors of the earth have been felt in some places.

Do earthquakes cover a great space ?

Some earthquakes in South America have been known to extend over tracts from seven

hundred to nine hundred miles in length upon the sea-coasts, and to some distance inland.

Are earthquakes felt at sea ?

During an earthquake the sea rushes upon the land in great waves, and then returns with the same force to miles out at sea, so as to be felt within the distance by persons in ships.

At what season of the year do earthquakes occur ?

They happen at all seasons ; in calm and cloudless weather and during rain and storms. Sometimes they occur without rumbling, so that people having no warning cannot escape from their houses, but are crushed beneath their ruins.

What is under the vegetable mould that covers the earth ?

The centre of the earth is supposed to be fire,—that which issues from volcanoes, and warms the hot springs ; over that fire is what is called the Crust of the earth.

Is the Crust of the earth all of one substance ?

The crust of our globe consists of a series of beds of rock, laid one over the other like the leaves of a book. The undermost of all these rocks has a different appearance from the other Superincumbent layers, and is called *the Primary Stratum*.

What is meant by Superincumbent, and by Stratum ?

Superincumbent signifies lying above something else, as a bed upon a bedstead. Stratum signifies a layer of earth. If some clay be laid on the ground, and some chalk spread over the clay, and some sand put upon the chalk, there are Strata of clay, chalk, and sand.

Why not say Stratums ?

Because Stratum is a Latin word, and requires a plural ending in *a*. One layer is a Stratum; and several, one over another, are Strata.

What is the second Stratum of rocks called ?

The first is called the Primary, the next in order the Secondary, and the uppermost the Tertiary formation.

Is vegetable mould laid over the Tertiary formation ?

No; between the mould and the rock is a covering of sand, gravel, and clay. Any person may see this who looks at a cellar which is dug out, but still unwallled.

Are rocks and loose soil of the same substance ?

Several substances are mingled in them, but the chief are Limestone, Clay, sometimes called Alumina, and Sand, called Silica, or *Silex*.

be porous; but in order to prevent water from straining, or Percolating through it, its surface is Glazed.

What is Glazing ?

It is a mixture of powdered flints and lead, which, rubbed over the surface of porcelain, makes it smooth and hard, causing it to shine slightly.

When Silix is very pure and transparent, what is it called ?

It is then Quartz. Quartz is sometimes so pure and transparent as to form the eyes of Spectacles instead of glass. It is then called Crystal. The phrase "as clear as crystal," expresses the clearest transparency.

Where is Silix found ?

This mineral abounds in all countries. It constitutes a portion of many mountain ranges, the sand and gravel of soils, and pebbles upon the sea-shore.

Does Silix ever form precious stones ?

It does. The Diamond is pure Carbon, and contains no silix; but Rock-crystal, the violet-colored Amethyst, and Carnelian, are formed of Silix and certain coloring matter.

Are these the only precious stones formed of Silix ?

There are several more thus formed: the

Agate, Jasper, and Opal : the Onyx, Sardonyx, and the stone on which Cameos are cut, are also forms of Silica.

Is Silica important to vegetation ?

Yes ; its presence in many soils is necessary to the growth of plants ; it is taken up in the stalks and grains. So much Silica is contained in a certain rush, the Equisetum, that it is called the Scouring Rush ; a handful of it serves as a scrubbing-brush.

To what uses besides Glass-making and Glazing can Silica be applied ?

It forms Gun-flints, Grindstones, and the Millstones used in grinding grain.

What is Sandstone ?

It is an Aggregation or conglomeration of sand and other matters. Brown-stone, or Freestone, is properly Red Sandstone. This stone is apt to Disintegrate, that is, to break into scales and particles of itself.

What are Aggregation and Disintegration ?

Aggregation is the union of a number of particles, as sand combined in a lump or mass of stone. Disintegration is the falling apart of a mass, as a stone or rock fallen to sand.

What suggested the idea of a boat ?

People saw that wood would float, and so they hollowed logs to serve them to move

upon the water; they found that by using their limbs they could swim, and go whither they chose in the water, and they contrived paddles to move their canoes or boats as they chose.

Have any people such primitive boats at the present time?

The Greenlanders and Esquimaux now employ one; of their own invention, called the Kayak. It is made of a light frame of wood, covered with water-proof skins. The top is also covered, leaving a hole for the Rower.

How does he sit?

He thrusts his lower limbs down into the boat, while his body fits the top as a cork fits the mouth of a bottle; then, with paddles in his hand, he goes to sea, to take fish and seals.

Had the Greeks and Romans better vessels than these?

Yes; they and the Tyrians, a famous people of antiquity, who lived near the Hebrews, at the head of the Mediterranean, had ships with sails, called Galleys.

What sea did they navigate?

Chiefly, the Mediterranean; though the Phœnicians, or Tyrians, sailed as far as Britain to procure tin.

Could the ancients sail out of sight of land?

They could not; because the use of the magnetic needle was then unknown, and the Mariner's Compass was not then invented, nor other instruments, which enable sailors to guide their vessels across the Ocean.

When were the uses of the Magnet discovered?

It is supposed to have been used by the Chinese, to direct them in land journeys, many centuries before it was known in Europe. The Compass was not made use of by Europeans very long before the voyage of Columbus, 1492.

What is a Ship?

It is a vessel fitted to cross the ocean, by means of which Men are conveyed from one country to another, and the commodities of one country are also transported from country to country.

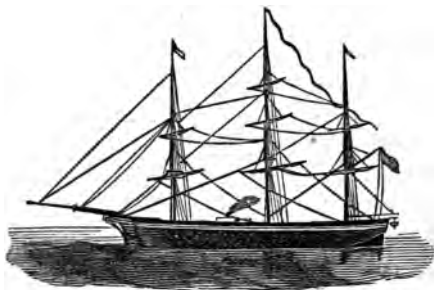
Have men always made use of large ships?

No: they probably have had small boats,
• and small sailing-vessels, for many ages; but large ships are an invention of modern times, or an improvement on former constructions.

Are ships mentioned in the Bible?

They are: "They that go down to the sea

in ships, and do business on the mighty waters," are mentioned in the Psalms.



A Ship.

What seas were the Hebrew people acquainted with?

Only the Red Sea and the Mediterranean. They had crossed the Red Sea, in passing out of Egypt into Arabia, and part of their own territory of Palestine lay on the Mediterranean.

Were the Hebrews a Maritime nation?

They were not: they were an agricultural people; but Solomon, the wisest and most powerful of the Hebrew kings, about ten centuries before the birth of Christ, carried on considerable traffic by sea.

What is Traffic?

It is buying, selling, and exchanging things for money. Money, of gold and silver, is a very ancient invention. Exchange of the

necessaries and luxuries of life is Commerce.

What first induced men to build ships?

Curiosity, the love of property, and the love of enterprise. They wished to see something they had never seen, to go where they had never been, to obtain what they had never possessed, and to try their own strength and skill.

How does all this appear?

They learned that they could make boats, and make good use of them: they thus crossed water they never had crossed, and beheld islands and shores they never had beheld.

Could men go out of sight of land without a Compass?

They could not go, with certainty of returning; but it is believed that they sometimes did go, for it is said that men from Europe visited the Azores, centuries before Columbus crossed the Atlantic.

Was Columbus the first discoverer of the Western Continent?

He first discovered the West India Islands and South America, but it is affirmed that navigators from Norway had sailed to the northern parts of the continent long before.

How long was this expedition accomplished before the time of Columbus?

About six hundred years. The Norwegians visited Iceland and the Shetland Islands, where they planted Colonies in the ninth century. They afterwards advanced westward to Greenland, and further south.

How did the vessel find its way over sea without a Compass?

By observing the sun by day, and the moon and stars by night. The sun rises in the East, and at mid-day is in the south. Moving in the direction of the Sun, or moving from it, the navigator would know which way he was proceeding.

Are the stars any guide?

One star, called the North Star, or Pole Star, always may be seen in the northern point of the heavens; so that steering towards that star, or from it, in any direction, the Mariner knows that he cannot be out of his way, should he design to go North or South, East or West, or between any two of those points.

Then why will not the heavenly bodies now serve to guide ships?

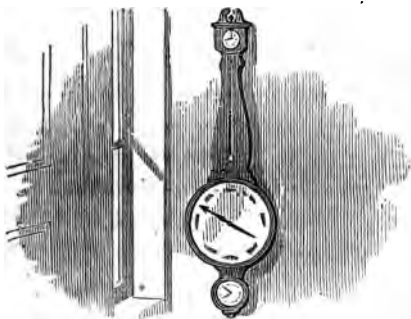
Because they are often obscured by clouds and storms, and the Compass and other instruments are more accurate than men's eyes, without such assistance.

What Sea did men explore, chiefly, before the discovery of America?

The Asiatics generally explored their own coasts, the islanders of different parts of the globe went out to sea in their little canoes, and those dwelling on the borders of the Arctic ocean adventured in the Kayaks.

But what sea did the Phœnicians, Greeks, and Romans sail over?

The Mediterranean ; the Phœnicians going beyond the Strait now called Gibraltar, some of their ships sailed northward to Britain, and some along the western coast of Africa.



A Barometer.

Who first circumnavigated the earth?

A small fleet of vessels commanded, at first, by Francis Magellan, a Portuguese navigator, in 1521.

Did Magellan return to Europe?

No; this adventurous navigator was killed by the natives of Matun, a small island not far from the Philippines.

What is Circumnavigation?

It is going entirely round the globe in a ship. Magellan sailed from Portugal, across the Atlantic, to South America, and discovered the Strait bearing his name. He then traversed the Pacific Ocean to the Asiatic islands; and his ships, after his death, proceeding across the Indian Ocean, and round the Cape of Good Hope, reached Europe by the Atlantic.

Was not the construction of ships improved in the fifteenth century?

Ships in that age were better than in any earlier one; but they were not nearly so large, nor so well finished and furnished as they are at the present time, nor was the science of Navigation so well understood.

What is the science of Navigation?

It is knowledge of the means to guide a ship over sea. The navigator must know something of Astronomy, and Nautical instruments, and also of Meteorology.

What are Nautical instruments?

Nautical signifies belonging to navigation;

nautical instruments are those used by **seamen**. A **Nautical Almanac** is one necessary to the navigator, and made for his use.

What is **Meteorology**?

It is the science which relates to clouds, storms, and all changes of weather. Such changes may be foreseen and provided against.

By what instrument is the weather indicated?

By one called the **Barometer**. The **Barometer** was invented by an Italian, named **Torricelli**, in 1644. This instrument consists of a glass tube, partly filled with mercury; as the air becomes lighter the mercury falls in the tube, and as the air becomes heavier, it rises.

How does that show approaching storms?

The tube of the **Barometer** has no air in it; air, which fills every open space, has been all drawn out of it, and the mercury rises without obstruction. The tube is set against what is called a **Scale**, on which is marked the state of the **Atmosphere**, by such words as **Dry** or **Rainy**.

Why does not air from without fill the upper part of the tube?

Because the top of the tube is so closely stopped up that no air can possibly penetrate into it: it is then said to be **Hermetically sealed**.

How does the Navigator know what weather will take place soon?

He has so nicely observed what weather follows certain signs present in the Atmosphere, and shown by the Barometer, that he can provide against gales and other changes thus shown.

If he foresees gales and storms, what can he do?

He can put his ship and his men in a fit condition to escape the danger they would else be in. Thus the Barometer is to him a useful instrument, and Meteorology a useful science.

What is a Navy?

It is composed of what are called Ships of War; these are public ships for the service of the country.

How is a Navy useful to a country?

Men of different nations are, very apt to get angry with each other; the people of one country say that those of another have done them great wrong, and must be punished.

In that case do not the angry nations settle their dispute without hurting each other?

Very often they do not agree upon what would be right for both parties, and they fight *with* and kill each other before they make

peace. The Belligerent nations, so these enemies are called, are then at war.

Do they fight at sea?

Their armies fight on land, but the Navy fights at sea. If the English and Americans are at war, the ships of the two nations fight when they meet together upon the ocean.

With what do they fight?

The ships have on board cannon, from which they discharge great iron balls that strike the ships and kill numbers of men in each. When one party can fight no longer, the commander of the ship Surrenders, or gives up.

What becomes of the ship that Surrenders?

It is then the property of the Conqueror: he has gained a Victory, and the officers and men of the ship taken are made Prisoners of War. They are taken ashore, and confined until the government they serve requires them to be returned to their country.

Is the Navy always engaged in fighting?

No; but it is always kept in readiness. The great ships always have their men and officers, always are at sea, or may be sent to sea.

Does a Navy prevent persons of one country from hurting others at sea?

The Navy is one Defence of the country

A nation which has a navy shows other nations that they can punish those who would injure them.

Have all nations in every age of the world had Navies?

Every nation whose coasts are liable to be ravaged by men landing from other countries, have endeavored to drive off their enemies by arming ships to prevent their approach.

Had the Greeks and Romans ships of War?

Their navy was on a much smaller scale than ours, consisting of armed Galleys. The Greeks are famous for two great sea-fights against the Persian fleets: one near the island of Salamis, and the other off the Promontory of Mycale.

How were the Athenians advised to build a Navy?

Themistocles, one of their great men, advised them to defend their city with "wooden walls," by which he meant a Navy.

With whom did the Romans chiefly fight at sea?

With the Carthaginians, who dwelt on the coast of Africa, and from one of whose ships, wrecked on the shore of Italy, they first learned to construct a ship. In ancient times, Pirates often attacked peaceable people.

What are Pirates?

Pirates are Robbers at sea; bad men who *fit* out ships and venture out to sea on purpose

seize whatever ships they can meet with, to land wherever they can, and carry off at they may find of any value.

Have Pirates existed in all ages ?

They have. Pirates plundered the Greek lands in the earliest ages ; they were a dreadful scourge in Italy and Sicily, and ravaged the western coasts of Europe before and after the birth of Christ.

Who were the Sea-kings ?

The Sea-kings, or Vikings, came from the north of Europe, from Norway and Sweden, and ravaged the coasts of France and England. Some of them landed, and at length settled in those countries.

Who were those settlers ?

The Normans in France, and the Danes in England ; the one people established themselves in the province of France now called Normandy, and the Danes gave kings, Canute and Harold, to the English.

Have the Northmen continued to be piratical ?

No, they have become Christians, are now just and humane, and have learned to stay at home and take care of their own property instead of destroying that of other people.

Are there any Pirates now ?

There are many, very ferocious and destruc

tive; savages of Borneo, and of other islands of the Eastern Archipelago. Ships of war, both English and American, are kept in those seas to protect merchant vessels from these marauders ?

Do men of civilized countries ever commit Piracy ?

This crime is still committed by men of different countries. Pirates are sometimes taken, brought ashore, and punished by death, or long imprisonment.

What is a Merchant Ship ?

It is one designed to serve Commerce, to carry the commodities of one country to another. An American vessel may carry flour, cotton, or any useful product of these States, to England, France, or any other country, and bring back silks, cutlery, and many other articles which this people want.

Who manages the vessel ?

The Owner fits her out for sea, having every thing put into her which he intends to send abroad, and the Captain takes charge of her while she is on the ocean.

Who go to sea in the vessel ?

The Officers of the ship: that is, the Captain and the Mates, men who assist the Cap-

tain ; sometimes a Surgeon or doctor ; a Carpenter ; and the Sailors, who are laboring men that work on board a ship ; a Cook, a Steward, and sometimes a Stewardess.

Who are Passengers ?

Passengers are persons who pay for living in the ship while she makes a passage from one country to another. The Freight or Cargo is the goods the ship carries.

Who is the Pilot ?

The Pilot is a man who guides the ship out of the Harbor from which she sails to the open sea. The ship is followed by the Pilot's boat, which takes him back. The Pilot also comes out to meet ships, and guides them into any Harbor.

Who plans a ship before it is built ?

The planner is a Naval Architect, and the builders are ship-carpenters, or Shipwrights.

What are the principal parts of a ship ?

They are the Hull, which floats in the water ; the Deck or floor of the ship ; the Hold, in which the Cargo is stored ; the Cabin, where the Passengers sit and eat ; the State-rooms, little apartments in which they sleep ; the Forecastle, where the sailors eat and sleep ; and a little apartment with the *Caboose*, or cooking-stove, besides the Steer-

age below, in which the poorer passengers sleep and eat.

Are many mechanics employed on a ship to complete her for sea?

The mast-maker, who sets up the tall poles to which the sails are attached; the block-maker; the rope-maker; the rigger, who fits the sails; the calker, who stops all cracks and crevices with oakum; the pump-maker, who puts in the ship's pumps; the anchor-smith, who provides the anchors; and others who paint and decorate her.

When is she ready for sea?

When she is knocked off the blocks of wood on which she was built, and Launched, that is, pushed into the water; when she has been furnished with her instruments and provisions, and has taken in her cargo.

What are her Instruments?

Chiefly the Compass, Chronometer, Quadrant, and Barometer; this last is not carried in all ships.

What is the Rudder?

The Rudder is that part which, moved by the hand, steers the vessel in the direction desired; the stem or Prow, the Head of the ship it is often called, advances first in the water; the Stern is the rear part of the ship.

What does the Carver do ?

The Carver is an artist ; he carves a wooden image, either male or female, or perhaps the figure of some animal. This is the Figure-head, and, placed at the Head of the ship, is designed to embellish it.

What is a Steam-ship ?

It is a vessel Propelled, or forced along the water by means of steam. Vessels formerly were urged onward by sails chiefly. The wind filled the sails, and thus, as it were, pushed the vessel through the water which floated it.

Did the ship proceed rapidly ?

Not always, for contrary winds would drive her out of her course, and, if long continued, would hinder her, and compel her to a long and wearisome passage. A Voyage is a ship's passage out, and a return to the country.

How are Steam-vessels constructed ?

They have a furnace, and a boiler containing many hogsheads of water. The water, boiled with a very strong heat, Evaporates, or makes steam. The steam sets in motion a *machine* or, engine, which moves a wheel to

which paddles are attached, and thus forces along the Steamer.

Is steam stronger than winds and waves?

It is, and serves to urge onward carriages and immense weights over land. Railroads are expressly made for the steam-engine and a Train of Cars.

Which moves with the greater speed, the Car or the Ship?

A Rail-car may be urged over the ground by steam at the rate of sixty miles in an hour, but a steam-ship rarely advances beyond that of sixteen miles.

When did the first steamer make a passage?

Several ingenious persons in different countries attempted to make steam-vessels before the present century, but none succeeded perfectly until 1807.

Who projected or planned the first steam-vessel in these States?

Robert Fulton, of New York city, built a steamboat called the Clermont, which made her first trip up the Hudson or North River to Albany in August, 1807. At first her speed did not exceed five miles and a half in an hour.

Was the Steamboat after that time employed upon other rivers?

Steamboats have been used for rivers and

coast passages from 1815, for all such navigable waters.

Were steamboats afterwards used in Europe?

Yes; in Scotland, England, and, gradually, quite to the Danube they have been, and still are employed, though this navigation is much more expensive than that of sail-ships.

Why is steam-navigation more expensive?

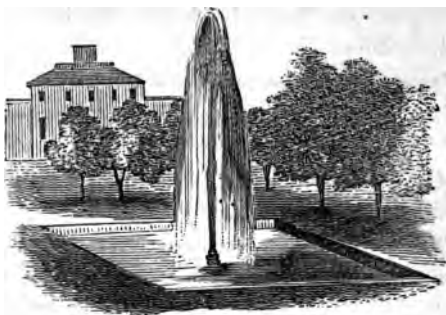
Because of the large consumption of fuel, either dry wood or coal, and the number of attendants required to keep up the fires and manage the engine.

When did the first steam-ship cross the Atlantic?

In 1838. In that year two steamers were built to cross the Ocean: the *Sirius*, and the *Great Western*. The *Sirius* started from Cork, and the *Great Western* from Bristol, in April; the former made the passage to New York in nineteen days, and the latter in fifteen.

What was the result of this success?

Steam-ships have been increased and multiplied ever since. They may now be met with on the waters of the Indian Ocean and on the Red and Mediterranean Seas, and are so improved in construction, that every week a steam-ship makes a passage from England to Boston or to New York in eleven or twelve *days*.



A Fountain.

What is Water?

Water is an element in nature necessary to our existence as much, as Air and Fire: without air we could not breathe; without Caloric (Fire) around us in the Atmosphere, and in every thing else in the world, our bodies included, we should be hard as a rock.

Should we then be human beings?

No. We might be an inanimate figure; but without any feeling, life, or enjoyment.

Why is water necessary to our life?

Because it is part of ourselves. We drink water, and inhale it with the air we breathe. It is part of our Blood, part of the Saliva in our mouths, part of our tears, and part of the perspiration that is constantly exuding from *the Pores* of our skin and from the Lungs.

If we have no water for a long time, what happens?

We suffer, for the want of it, intolerable Thirst: and if privation of it is long continued, we must die; because all the fluids in our bodies exhale, and expel the water we may have drunk, and we need more to replenish it.

Could we not drink some other liquid?

Should we do so, every liquid we could drink, and all the meat and vegetables we could eat, cooked or uncooked, contain more or less water.

Is water a Simple substance?

It is composed of two Gases, invisible to the eye when separated, but which, when united, form water.

What gases are the constituent parts of water?

Water is composed of Oxygen and Hydrogen. If three pails of water should be divided into oxygen and hydrogen, we should have one pail of oxygen and two of hydrogen.

Is the weight of these gases the same?

No; oxygen weighs eight times as much as hydrogen. If we have nine pounds of water, eight pounds of it will be oxygen, and one pound hydrogen. Eight-ninths of pure water is oxygen, and one-ninth is hydrogen.

Can water take different forms?

Yes: in Ice, or the solid state; in the Flowing, or fluid state; and in the Vaporous, or steam state.

What effects these changes?

Caloric, or heat: ice containing the least of all, fluid water a greater quantity, and steam so much caloric as to be driven with force out of any vessel and then dispersed in the air.

How great is the expansion of water in steam?

One cubic inch of water will expand to a cubic foot of steam.

What is the degree of this Force?

It is such as to move great machines for grinding, lifting, and sawing, besides other mechanical operations; and also to propel carriages and ships.

Does water imbibe the taste of other substances?

Water, in itself, is colorless and without odor: its flavor is cool and refreshing; but if it taste of any substance, that substance has been added to pure water.

What example can you give of that?

What we call Tea and Coffee, is only the flavor of tea and coffee, extracted by boiling water; the tea-leaves and coffee-grounds remain, but are quite tasteless.

Does water mix with every substance?

No; water will not mingle with Fat or oils: we say these have no Affinity with water; that is, they will not dissolve in water, nor absorb it, nor mingle with it.

Are many substances soluble in water?

Yes, many: many that are sweet, sour, bitter, astringent; many that are poisonous, and which are well or ill flavored, mingle with water, and give their taste to it.

Is water quite pure?

Water is rarely quite pure; gases not belonging to it are expelled by boiling it.

Has rain-water these gases in it?

Rain-water does not contain other matters, like spring-water; but, mingling with Exhalations from the ground, as it falls, this water is not free from different gases.

Are these gases unwholesome?

They are not generally unwholesome. We, who all drink water, should be ill, and not live out half our days, if common drinking-water were not healthful.

What sort of water contains the greatest quantity of other substances?

Spring-water, which is strained through certain soils, and the crevices of rocks, often *imbibes the flavor of lime, sulphur, or iron.*

When these flavors predominate in any waters from the earth, their fountains or sources are Mineral Springs.

What is Hard water?

Such as does not mingle with soap, nor with the matter to be washed with soap. This is because there is lime in the water.

Does water enter into all vegetables?

It does. A Drought, often called a Dry Time, is very injurious to vegetation. The roots of plants drink up water from the soil; it rises in their stalks and trunks, helps to form the matter of seeds and fruits, and sustains the bark and leaves.

What is the great reservoir of water on this Globe?

It is the Ocean, a vast body of salt water, covering above two-thirds of the earth, forcing its way and dashing its great waves into the Gulfs, Bays, Creeks, and Estuaries of all countries.

Is the Ocean anywhere divided?

No. It is one mighty envelope of the earth, upon which a ship may sail completely round the world, and return to the harbor it started from.

Do different parts of the ocean bear different names?

They do. Between America on one side,

and Europe and Africa on the other, it is called the Atlantic; between the western shore of America, and Asia and New Holland, its broad expanse is the Pacific; between the western coast of New Holland and Africa it is the Indian Ocean; and around the north pole it is the Arctic.

Do the waters of the ocean form clouds?

They do; the whole surface of the ocean is constantly evaporating, rising upward to a great height, and there, being condensed into masses called clouds, they float over distant lands and pour down in rain, snow, and hail.

Is sea-water salt?

Sea-water contains common salt, lime, soda, magnesia, potash, and iron. All these substances combined give sea-water a disagreeable flavor, and make it unfit to drink; they weigh half an ounce in every pound of sea-water.

How have these substances become part of Sea-water?

They are emptied into it by the numerous rivers in every country which pour into it. The rivers pass through soils which contain them, and wash the salt, soda, and lime down to the ocean. This process has been going on since the ocean and the rivers were formed.

Does pure water only evaporate from the ocean ?

Pure water only forms the vapor arising from the sea ; the salt, soda, and other mineral substances continue in that portion that remains in the water not evaporated. When sea-water is frozen, all these minerals fall to the bottom and leave the water pure.

What are salt Lakes ?

Salt lakes are such as receive rivers and streams that feed them with the same minerals as are found in sea-water.

Are any parts of the Ocean called Seas ?

Where the sea enters a space of great extent between lands on two sides, it is called a Sea, as the Mediterranean and the Red Seas.

How has the Mediterranean been described ?

“ On those shores were the four great empires of the world—the Assyrian, the Persian, the Grecian, and the Roman. All our religion, almost all our arts, almost all that sets us above savages, has come to us from the shores of the Mediterranean.”

What are Springs of water ?

They are water contained in the earth, but the water of springs is not still or stagnant, *like that* in a cistern or a tub.

How do springs originate ?

Rain descends from the clouds and falls upon high hills : like the water that falls on the house-top, the rains flow from the surface of the hills and penetrate into the soil.

How are rains collected into springs ?

The earth contains open spaces like a sponge ; and rocks and beds of metal beneath the earth's surface have many cracks and crevices. The water flows through these and makes its way underground to the beds of rivers.

Do you know why by digging a well the diggers usually come to water ?

Because of the quantity of water which is almost everywhere contained in the earth. If there were no high ground to receive water the whole earth would be overflowed.

What is a River ?

A river is a stream of water flowing through a country, and at length losing itself in the sea, or in a lake, or in another river. High banks and mountains between which the river flows in its whole course, are the Basin of the river.

What is the Bed or channel ?

The Bed of a river is the low ground at the bottom of it ; the Source is the beginning of

it. A river is formed of many springs finding their way out of the ground at the foot or sides of hills, and pouring one after another into one stream.

What is a Brook ?

A Brook is a smaller collection of water than a river, and formed, like a river, by the junction of springs. A Rivulet, or little river, is one of those wandering streams which, meandering through fields and woods, over rocks and stones, at last loses itself in a river.

What is a Tributary ?

A Tributary is a river which falls into another river. The Missouri is a tributary of the Mississippi river. Tributary streams are sometimes called Affluents and Feeders, or branches.

What are Banks of rivers ?

Banks are the solid land rising above the stream which confines or keeps it within its bed. The borders of the ocean are its Shore or Coast.

What is a Delta ?

A Delta is land lying between the diverging branches of a river. The Delta is so called because the land so inclosed is shaped like the Greek letter Delta Δ .

Where is the Delta formed ?

Not very distant from the mouth of the

river ; approaching the sea the river spreads to much greater breadth, and land, properly an island, fills the space, leaving a passage for the water on both sides.

Has the river inclosing a Delta more than two passages ?

Sometimes the water divides into several streams, and all but two of these pass through the delta. The Ganges approaches the Bay of Bengal through ten branches ; the Danube empties into the Black Sea through seven ; and the Nile finishes its course in the Mediterranean through five.

Does a river ever overflow its banks ?

Yes ; when great rains have swollen the springs, and they have poured an unusual quantity of water into the river, it rises to greater height, and flows over the low lands upon its borders.

What is this overflow called ?

When very abundant and destructive it is an Inundation, and when the river is small its overflow is a Freshet. Rivers, in hot seasons, are often very low, and the water is shallow. In very cold weather they freeze over, and make solid ice.

Does the ocean ever freeze ?

Sometimes near the shore it freezes in winter. On the borders of the Arctic Ocean are

great masses of ice which never thaw ; these are Icebergs, and are as high as a lofty church spire, and often cover more space than ten churches.

Do Icebergs always remain in the Arctic Ocean ?

Not always, they sometimes float down into the Atlantic Ocean, and create great cold wherever they approach.

Are icebergs dangerous ?

When an iceberg comes unexpectedly upon a vessel, if it strikes her she is instantly sunk.

How can overflowing of the sea or of rivers be guarded against ?

By raising great banks of earth called Dykes, where the water is likely to overflow.

Do streams of water flow in a straight course ?

No, they wind and turn in many directions ; this is a Sinuous course, and the windings are Sinuosities.

What is a Canal ?

A canal is a channel cut in the ground, through which water is conducted with design, that boats may make the passage and transport goods by a shorter track than could else be done.

What is the longest canal in the United States ?

It is the Erie canal, extending from Lake Erie to Albany, above three hundred miles, and emptying its water into the Hudson river.

What are thus connected ?

The waters of the great lakes and those of the Atlantic Ocean.

What is a Bridge ?

A Bridge is a passage made from one bank of a river to the opposite bank. It is commonly a road of planks or stones laid upon arches called Piers. The piers stand fast in the water beneath, while the bridge spans its banks.

What is a Forest ?

It is a large number of trees standing near one another, not planted by the hand of man, but the natural growth of the soil.

What is the difference between a Forest and an Orchard ?

The forest is the spontaneous growth of the earth ; the Orchard is a plantation of fruit-bearing trees, designed to afford sustenance to human beings, as an apple-orchard or a peach-orchard.

Where are forests commonly found ?

Forests exist in all countries, but they are usually found of great extent in what is called a new country, a country that is not much inhabited nor cultivated.

What has occupied the forest for ages ?

Animals of divers sorts. Some burrow in the *ground beneath* the trees, as rabbits and squir-

rels, and some shelter themselves in the bushes; birds build in the branches, and insects innumerable feed upon the leaves and bark of the trees.

Where are the Tropical forests ?

They are in countries called tropical, in South America, and in the West India islands; in Southern Asia and the islands of the Eastern Archipelago.

Does a tropical forest resemble those of colder countries ?

Both contain trees, but those of the tropic land are different from those of colder countries, and the animals which abound in the former are different from those of the latter.

What are the principal trees of tropical countries ?

The Banian-tree, the Teak-tree, many fruit-bearing trees, and all the Palms and Coconut trees, besides Nutmeg and Cinnamon trees.

What animals abound in these forests ?

A tropical forest exhibits Parrots, Macaws, Peacocks, and the gorgeous Bird of Paradise, besides many other birds of smaller size and the most brilliant plumage.

What quadrupeds are found in these forests ?

Nimble monkeys enliven them with their gambols, and the Orang-Outang stalks beneath the trees, in some resemblance to the

human form ; while the majestic Elephant and the Rhinoceros, of magnificent bulk and harmless habits, subsist in these shades.

Are any ferocious animals found among them ?

The terrible Lion, the cruel Tiger, and the most ravenous beasts of prey are natives of these forests.

What is Bamboo ?

It is a running plant, which grows in a wild state in tropical forests. Chairs, and many articles brought from the East, are made of Bamboo. A stick of it resembles a cornstalk, dry, and stripped of its leaves ; but it is harder, stronger, and much thicker and longer.

Is bamboo very useful ?

It is very useful. It grows large enough to form poles, canes, and even beams of small houses. When slit into strips, it is woven into mats, baskets, window-blinds, and chair-bottoms.

Does bamboo make paper ?

Bruised and crushed in water, by the addition of a little cotton, the whole well beaten, it forms paper like that used in China.

Does Bamboo climb like the grape-vine ?

No ; bamboo is a Creeper, not a Climber. *the stems are often from thirty to fifty feet*

in length. A great number of these grow over a large space of ground, intertwisting together, some kinds having spines or thorns upon them.

What is this mass of bamboo called?

This thick growth of bamboo is called a Jungle, and cannot be entered without danger, for in its impenetrable shelter many wild beasts make their Lairs.

Are jungles ever found near towns?

They are allowed to remain there, because the Cane affords such excellent materials for many necessary uses. Near Calcutta, and many Indian villages, the jungle is suffered to grow.

Are not the inhabitants afraid of the wild beasts which harbor there?

They watch for them, and kill them; but wherever men live, in considerable numbers, predaceous animals naturally fear and avoid them, though, watching an opportunity, they will fall often upon their domestic animals.

What is the Teak-tree?

The Teak is a very valuable wood, which is abundantly produced in the island of Java, and commonly used for the building of ships: it is sold in great quantities.

What is Timber?

Timber is the trunks of trees, with the bark hewn off, and shaped into square beams. Such beams, when sawn apart in thicknesses of three or four inches, are Planks, and when cut thinner are Boards. Beams of different woods, Planks, and Boards are often called Lumber.

What is the Bread-fruit tree?

The bread-fruit tree is a native of India and the South Sea islands (those of the Pacific Ocean). It is a tree of moderate size, attaining only to forty feet in height in Bengal.

Why is it called the Bread-fruit tree?

Because it produces a large nut, the kernel of which is used for bread. This fruit is of the bulk of a middle-sized melon. It is smooth and green like a water-melon.

Is this fruit cooked for use?

It is roasted, and then becomes soft, tender, and white, resembling the crumb of a wheat-loaf: it must be eaten new, or it becomes hard and choky.

Who subsist much upon it?

The South Sea islanders feed upon it constantly, and the English have transplanted *trees of this fruit* to the West India islands:

however, the negroes in those islands prefer the native fruits. The flavor of the bread-fruit is said to resemble that of the Yam and Potato.

Is the Potato a native of hot countries?

The potato grows in hot and cold countries. It was first taken to England about 1586, by Sir Walter Raleigh, who had found it in Virginia, where he supposed it to be indigenous.

Was the potato soon cultivated in England?

At first, it was only cultivated in gardens as a curiosity. A gentleman in Ireland, who received a present of some potatoes, first introduced them into that island. There, in the course of time, they have become a principal article of food to laboring people.

Whence is the name, Potato, derived?

This name was given in Portugal. The Peruvians called it pa-pa; the Spaniards altered this name to ba-ta-ta, which signifies "of the earth;" this the Portuguese softened into Potato. The Spaniards and Portuguese had imported this useful vegetable before Sir Walter Raleigh did so.

When did the people of England adopt potatoes for the table?

It was one hundred and fifty years from its

introduction before potatoes were cultivated in fields, produced a large crop, and were sold in market in Britain.

Have potatoes deteriorated latterly?

Yes; they have decayed in the ground, or immediately after having been gathered in; but they are still cultivated, though they are not so cheap and abundant as formerly.

Are Figs produced in hot countries?

The Fig grows on a small tree, not in very hot countries. Our best figs are brought from Smyrna, in Asia Minor, now part of Asiatic Turkey. Figs grow in the open air in Georgia and Florida, and may be produced in colder countries when the tree is sheltered.

Where does the Mahogany-tree grow?

In Honduras, a part of Central America. South America produces the valuable tree which affords India-rubber.

What is the proper name of it?

Caoutchouc. The tree which produces this substance ranks among the most magnificent of forest trees. It may be distinguished by its dense, lofty, and ample crown, being one hundred feet high, and sending out extensive branches on all sides.

How is its juice procured?

By *Transverse incisions*; that is, cuts made

across the bark. Under these incisions receptacles are placed in which the juice, flowing from the wounds of the tree, is collected in a fluid state.

What is the appearance of it?

When this juice first flows out it is white, and as thick in consistence as cream : when it ceases to flow, it is spread over moulds and dried in smoke ; then it is fit for use.

What are the uses of India-rubber?

It will make boots and overshoes, bags and cushions, besides being manufactured into garments impenetrable to water. One of its most convenient uses is effacing pencil marks from paper. It has been so used for about eighty years—since 1770.

What is one remarkable property of India-rubber?

Its Elasticity ; that property in bodies which makes them, when drawn out, return by a spontaneous motion to their first form and dimensions.

What does Elasticity consist of?

Elasticity consists of Expansion and Contraction. Whatever can be stretched beyond its natural length or breadth possesses Expandibility ; and whatever expanded substance returns of itself to its natural size or a smaller space, possesses Contractibility.

Does Gutta Percha resemble India-rubber ?

In some respects it does. Gutta Percha is also the solidified juice of a tree. This tree grows in Malacca and Borneo. It is obtained from the sap like India-rubber.

To what use is Gutta Percha applied ?

It makes water-proof soles to shoes and boots : it does not soften or become stiff, as it may be heated or cooled, unless it be softened in boiling water, and is very adhesive. It has been used in Europe since 1843.

Have Forests any effect on Climate ?

The forests serve as a garment to the earth in winter, keeping it warm by shutting in the central heat which would otherwise radiate more rapidly into space, leaving the earth much colder than it now is beneath the shelter of trees

What effect have forests in summer ?

They mitigate the extreme heat of the sun which falls upon their tops, while their shade upon the ground, caused by interrupting the direct rays of the sun, prevents excessive drying up of the soil.

Do men and animals derive especial benefits from forests ?

Wild animals have their abode, and rear

their young in them, finding there "from storms a shelter, and from heat a shade;" and men find in forest trees that precious article, wood, which furnishes them with many necessities and comforts.

Should wood be used carefully, and trees be protected?

It takes centuries for some trees to grow to great magnitude, and years, more or less, to make any tree valuable; therefore, wood should never be wasted, nor trees needlessly cut down.

What is the cutting down of forests in a new country called?

Burning, or cutting down trees, and drawing the stumps and roots from the soil, is called "clearing the land." When this is done, the farmer may build a house and barns; he may keep cattle, and cultivate the fields.

What effect has rain upon forests?

The rain falling upon abundance of leaves, or foliage, is poured slowly from them upon the ground; the earth, little by little, imbibes the water, which gradually penetrates to springs and supplies them.

Would not treeless ground do the same service?

No: because the rain would pour off rapidly as from the roof of a house, and not be so equally distributed, but flow directly to the bottom of a hill or mountain.

Do not some trees flourish best in dry soils ?

Some seem to prefer a high and dry position, and many grow best in low and wet ground : the Willow is one of these.

Are there any other uses of trees than those you have mentioned ?

By adding to the beauty of a country, forests and shade trees about our dwellings are of vast importance. They are, when planted out in rows on the borders of streets, a great ornament and comfort. Strip the hills of a country of their trees, and they would present a sad and gloomy aspect.

Are there no tracts on the globe destitute of trees ?

There are many such tracts : in these States called Prairies ; in South America, Pampas ; in Russia, Steppes ; and in Africa, the Desert. The prairies of the Western States are fertile, covered with grass and native flowers ; the deserts of Africa and of Arabia are formed of sand.

Are there no trees in these deserts ?

At distances of many miles apart a cluster of palms may sometimes be seen growing upon a fertile spot in Africa : this is called an Oasis, which also affords water. The

traveller, who has not for days, perhaps, seen a tree, rejoices in the sight of this grove of the desert.

What are the native trees of the Middle States and of New England?

Those which flourish in these States, either indigenous or naturalized from other countries, are, principally, the Oak, Elm, Ash, Beech, Hickory, Wild Cherry, Maple, Chestnut, Linden, Buttonwood, and Birches.

Are there not also Evergreens?

These are Pines, Firs, Spruces, Hemlock, and Cedar.

What is the effect of Autumn upon trees in this region?

The autumnal woods change the green of summer to innumerable hues : every tree has then its own color, or many succeeding colors. The oak leaves become scarlet, yellow, and brown ; the sugar-maple comes out in rich yellow and orange, and the sumach shrub in brilliant crimson.

Do other vegetables attach themselves to trees?

Yes : Mosses, Fungi, and beautiful Climbers. The mosses upon old forest trees are of many colors : different greens, purple, white, and brown ; the fungi, resembling a mushroom, but hard and leather-like, attach to decayed and prostrate trees ; while the ivy,

dodder, and other creepers, wreath the trunks of the living.

What is one of the most valuable trees in the world?

The Oak, which is of many kinds or Varieties; as White oak, Black oak, Red oak, and Shrub oaks. These differ in size, in the color of the wood, and somewhat in the shape of their leaves: still, they so much resemble each other, that when seen anywhere they are all known to be of one species—to be Oaks.

What is the country of the oak?

The Oak, the Chestnut, and the Hazel are to be found in all temperate regions of the earth. While the Palms are the glory of hot countries, and the Pines of cold regions, the Oak is the friend of mankind in those parts of the world which enjoy a middle temperature.

For what is the oak remarkable?

For the firmness and durability of its wood, for the strength and Tenacity of its roots, for the tannin contained in its bark, and for the majesty of its appearance.

Was the oak ever regarded with peculiar reverence?

It was. Before men were acquainted with *the true God*, they were Pagans, and wor-

shipped false gods: these they often consulted, and worshipped in groves of oaks.



An Oak.

Who worshipped in oak groves, particularly?

The Greeks resorted to an oak grove, at Dodona, to consult their god Jupiter; and the Britons, before and after the birth of Christ, worshipped in groves of oak, being taught to do so by their priests, the Druids.

What is the fruit, or seed of the oak?

The fruit of all plants is the Seed, or it contains the seed; the pulpy apple contains seeds, and the luscious cherry incloses the Pip, or stone, so called from its hardness, which is the seed. The seed of the oak is the Acorn.

Does the Acorn grow within a husk?

No: while the Chestnut is enveloped in a

prickly husk, and the hickory-nut in one thick and bitter, but without spines, the acorn is naked; a small oval nut, with a smooth skin, set in a pretty cup.

Is the kernel fit for food?

Not for human food, but it is nutritious to swine. The oak, growing naturally in Europe, Asia, and in the northern parts of Africa, contributes to the subsistence of many kinds of animals.



A Stag.

What are these animals?

In Europe, the Stag and Wild Boar winter upon acorns; in Asia, Pheasants and Wood-

pigeons share them with animals of the Deer kind. In our own native forests, the Bear, the Raccoon, the Squirrel, the wild Pigeon, and the wild Turkey delight in them.

Where were Swine fed principally on acorns?

The people of England, nine hundred years ago, valued the oak chiefly for its acorns, which fed their swine.

Did they gather the acorns for them?

No; a man whose office was that of Swine-herd, drove them daily in a Herd or Flock to the woods, where they fed themselves on acorns.

Is a similar use made of them in our country?

Yes; in the State of Virginia, swine turned in summer into oak woods, are collected in autumn, and killed. Thus fed, they are small, but their flesh is well-flavored, and Virginia hams are much liked for that reason

What do the oaks of Spain afford?

The substance of Cork; this, sent extensively to other countries, is oak bark. In England, oak bark is used to tan sole-leather.

Is the Oak-tree long-lived?

The oak springs from the acorn; this falls beneath the parent tree, takes root, and at first thrusts up the slender shaft that is destined to

become the lofty oak, or it is planted by the hand of man. In either case it may last centuries.

Does the oak grow rapidly?

No; like all natural productions designed for long endurance, it matures slowly. An oak of the larger kinds when thirty years old may be forty feet high, and may then be cut down for its various uses.

Is that height its greatest size?

The oak requires one hundred and fifty years to attain its greatest amplitude, nor does it then decay; there are oaks yet standing supposed to be one thousand years old.

Is an oak easily distinguished?

Yes; persons accustomed to observe know the oak at sight when stripped of its leaves. The limbs stretch out horizontally, they are of a size uncommon to other trees, and are not straight, but crook and bend upwards and downwards, right and left.

To what purposes is oak wood applied?

It furnishes the best ship-timber; carriage and wagon builders use it for spokes of wheels. Many parts of agricultural instruments are made of oak wood, as the handles of ploughs, spades, and axes, and the tongues and axle-trees of carts.

Is oak bark used by the tanner?

Not so much in this country as in England. Hemlock bark being cheaper and more abundant, is more used for tanning in the United States.

Will oak wood make charcoal?

All wood may be charred or burnt to coal, but the best charcoal for sale is made of oak.

What are oak-apples?

The oak-apple is so called because it looks like a small apple. It is not a fruit, but an Excrescence of the oak.

What is an Excrescence?

An Excrescence is like a wart on the hand. It grows in like manner upon some tree or animal. The oak-apple, sometimes called a gall-nut, is made by an insect. The female perforates the leaf of an oak and deposits eggs in it. The leaf then swells out to a spherical form often two inches in diameter.

What is a Diameter?

A Diameter is the measure of a Circle or a Sphere, through the centre, from side to side.

How much greater is the Circle itself than its Diameter?

The Diameter measures about one third of the circumference of a ball or Sphere; therefore the oak-apple which measures two inches in diameter, in Circumference is six inches.

Where are the insect's eggs deposited ?

A leaf has two sides, called the upper and under surface : these are two very thin cuticles, which look like gauze when dry, and parted ; between them is a thin layer of green pulp, and many fibres fine as lace. Between these two parts of the leaf the insect burrows.

When does the gall-insect come out ?

When she has left the eggs, her Progeny, that is, her little ones, follow when ready. The leaf thus occupied swells to the size of a small apple. The insects leave a little hole in it through which they have escaped ; and, at first green, it becomes brown and dry.

What does the oak-apple contain ?

One kind, produced on a particular species of oak, contains a powder which is a strong Astringent, that is, it draws up pores of skins like Tannin and Alum.

Can any use be made of this gall-nut ?

It may be used to dye cloths black, and to make ink-powder.

What verses have been made on the Oak, describing it as full grown and beginning to decay ?

" See where the oak its awful structure rears,
The massy growth of twice an hundred years ;
Survey his rugged arms, with moss o'ergrown,
His lusty arms in rude disorder thrown,

His forking branches wide at distance spread,
And dark'ning half the sky his lofty head.

"His airy top the clamorous birds invest,
And crowd the waving boughs with many a
nest.

Midway the nimble squirrel builds his bower,
And sharp-billed pies the insect tribe devour
That gnaw beneath the bark their secret ways,
While unperceived the stately pile decays."

"Clamorous Birds," signify loud-cawing birds like the Crow. "Sharp-billed pies," mean Woodpeckers, which may often be seen piercing the bark of trees.

What are Pines?

They are evergreen-trees; they belong to a family sometimes called the Coniferæ, because the seeds of all are contained in Cones: they are also called the Fir family.

Are there many varieties of these trees?

Yes: Pines, Firs, Junipers, Cypressess, Larches, Hemlocks, Spruces, and Yews, all belong to this natural group of trees.

Where do they grow?

They inhabit all parts of the world where other trees grow, and may be seen in regions

so cold that no other will flourish there, as towards the Esquimaux country in North America, and also in the northern parts of the eastern continent.



Pine-trees.

Do the Pines grow to great height?

The White Pine is much the tallest of our native trees. Some are still standing in New England reaching nearly to two hundred feet. Most of the trees of this family have a straight cylindrical trunk, and are often of great size and height.

What are Pine Cones?

A Pine Cone is shaped like a pine-apple, but consists of rows of woody scales, one row below another, and at the bottom of each scale lie two seeds. When quite ripe, the

scales open, and the seeds, falling out, sow themselves in the ground.

Are the Cones of all the Coniferæ of one size ?

No : different sorts of trees have differently sized cones ; some are shorter and some longer than others. The cone is sometimes not bigger than a small thimble, and sometimes it is as large, when the scales open, as to fill a pint bowl : there are all-sized cones between these.

Are seeds of the largest cones useful to man for food ?

There is a kind of pine in Italy called the Stone Pine, the kernels of which are eaten. Birds pick out the seeds of many sorts, though they are so well defended by the woody scales. The seeds of some pines require three years, and others four years, to become perfectly ripe. The stone pine takes four years.

Are the leaves of the pines all alike ?

They are generally needle-shaped, though differently arranged on sprays of the branches. The leaves of different Coniferæ may be regarded as long needles or short pins, sometimes growing in little clusters, and sometimes placed regularly opposite on the sides of a twig.

Is pine wood used in building ?

Yes ; in ships and houses it is much employed. From pines the tall masts of ships

are made round and smooth for the purpose; planks and boards sawn from pine logs make the doors, floors, and finishing of houses.

Is household furniture made of pine wood?

Much of our furniture is made of pine wood, as common tables, and boxes for many uses. Other articles, as bureaux and wash-stands, painted over tastefully or plainly, are common.

What are Juices of pines?

They are what is called resinous, forming Resin, Turpentine, Tar, and Pitch. These are extracted from the wood.

Does this resinous juice abound in these trees?

It does, and may be seen at the ends of sticks of dry pine wood. This is Turpentine, and has a strong odor. Yellow resin is obtained from turpentine boiled down.

How are Spirits of Turpentine made?

By putting turpentine into a vessel with water and distilling it. This substance is often put into house-paint to hasten the drying of it; it is also an ingredient in varnish, and is sometimes used in medicine.

Are spirits of turpentine injurious to the skin?

This is what is called an Acrid substance, and will, by imprudent contact with it, destroy the skin, and do much harm to animals. It

is very combustible, and should be used with care.

How is Tar made ?

Tar is made by burning split pine, both root and branch, very slowly, excluding the air as much as possible. The resinous matter of the wood, imbibing some of the smoke, falls into the bottom of the cavity in which the burning takes place, and becomes Tar.

What is Pitch ?

Pitch is tar and resin melted together. Lampblack is the soot collected from mingled pitch and tar. Burgundy Pitch, used for plasters by rheumatic persons, is obtained from Norway Spruce.

What is the use of Tar ?

Tar and pitch both exclude moisture, therefore the bottom of boats, and the ropes used on board ship, are tarred.

Is Pitch mentioned in the Bible ?

Yes ; the mother of Moses made a little cradle or bed for her infant, "an ark of bulrushes, and daubed it with Slime and with Pitch, and put the child therein ; and she laid it in the flags by the river's brink."

Was this Pize-pitch ?

It is supposed to have been Asphaltum, a substance so like Resinous Pitch that it is

called "Mineral Pitch." It was used in Egypt.
(Exodus, Chapter I.)

Do pines require a rich soil ?

No ; they will grow in a poor sandy soil, and are often planted in sandy places to make their dreariness more cheerful. In North Carolina there are large tracts of land called Pine Barrens.

Can such land be cleared and cultivated ?

Its sands could not be made productive, while its pine forests are profitable, because abundance of pitch and tar may be made from them.

What is Hemlock ?

It is a conifera which is valuable for its bark. This bark is of a red color, and is ground up into the substance called Tan, for use of the tanner ; it gives the red color to sole-leather. Hemlock bark, when quite dry, is sometimes used for fuel.

What is Spruce ?

Spruce is another conifera ; it is most valuable for its wood. It is used for making ladders ; is suitable for small timbers or beams, and of it shingles are made. A kind of beer is made of the young shoots of the Spruce.

What is the Larch?

It is a member of the same family. The Larches are Deciduous, that is, their leaves fall off in autumn; therefore the Larch is not an evergreen, though its leaves are needle-shaped, and its wood resembles other Coniferæ, while it is hard and durable.

What did the Indians call this tree?

They called it the Hacmatac, a name it still bears in New England. The pointed leaves of this tree are arranged in little tufts, or clusters.

What is the Cedar of Lebanon?

It is a very celebrated tree, growing principally on Mount Lebanon, or rather on the Libanus, an extensive range of mountains in Syria. Some of these trees are cultivated in gentlemen's grounds in England.

What are the special properties of these trees?

The Cedar of Lebanon throws out long branches horizontally, bending downward, and bearing dark foliage. The whole tree takes a pyramidal form, and the interior wood of it is of a deep pink color.

What are the properties of this wood?

It is not only durable, but beautiful, and easily wrought. David, the Hebrew King, ten centuries before Christ, said, "I dwell in

a house of Cedar," which means that the palace in which he resided was finished with this wood of Libanus.

How did Solomon use it?

Solomon, after his father David's death, erected a splendid church, or Temple, on Mount Moriah in Jerusalem, and he procured large quantities of the Cedar wood for this grand edifice.

Do Cedar forests remain in Syria?

They still exist, and afford oaks and pines, besides the famous cedars. Vast quantities of timber, of all these kinds, are exported annually to Egypt.

What is Red Cedar?

It is an American tree of no very inviting appearance, frequently seen in barren spots, and along road-sides. The inner wood of it is a beautiful darkish red, and sweet scented. It makes excellent posts for fences, and is usually employed as the wood of lead pencils.

Does cedar wood make good staves?

They make staves for pails and nice tubs, and also make shelves, and bottoms of drawers, which are liked for their aromatic scent.

What is Cypress?

It is a low evergreen tree, a native of Europe, Asia, and some parts of North America.

Did other Greeks besides the Spartans cherish the Plane-tree ?

It was the greatest favorite of the Romans; they planted it around their country houses for its grateful shade in summer, and its free admission of the sun in winter.

How did the Romans procure the Plane-tree ?

It was conveyed from Greece to Sicily, from Sicily to Italy, and from Italy to Spain and France; the latter was then Gaul, and there, when the trees became lofty and afforded an ample shade, people would pay for the privilege of a seat beneath one.

Do the Asiatics value the Plane ?

The Persians have a great admiration for this tree, which they call the Chinar. There, where timber trees are rare, they make furniture of its wood.

What is the native country of the Plane ?

It is found in Europe, Asia, northern Africa, and in North America. There are two species of it, the Oriental and the Occidental Plane. Oriental signifies coming from the east, and Occidental from the west.

How is the Plane-tree known at sight ?

First by its bark, which is of a light greenish-gray color, upon which appear dark pieces

of bark that seem to be scaling off the under bark; and then by its balls, and its thick foliage.

Is the Plane a large tree?

It is among the loftiest and largest trees known. When very old one side of the trunk will often open and seem to expand, leaving a cavity within, and a canopy of leaves above. One of these trees in Lycia of Asia Minor, thus hollowed out, once received a company of nineteen persons.

Have Plane-trees lately decayed?

All over the world, since 1841, Plane-trees seem to be dying out, except some that are very young; these promise to supply the loss of the older trees.

Is the wood useful in this country?

It is not used for mechanical purposes, but when dry makes good fuel for stoves.

What is the Magnolia?

It is a tree famous for its flowers, and is a native of these States. In Massachusetts the native Magnolia is only a shrub, but in the Southern States it attains to great size.

When transplanted does the Magnolia flourish?

It does; one of these trees is growing perfectly well in the Botanic Garden near Boston.

Is the Shrub Magnolia a beautiful specimen ?

No plant in every season, and in every condition, is more beautiful. It thrives in wet ground, and produces flowers almost as large and fragrant as the Water-lily.

Which of our native trees resembles the Magnolia ?

The Tulipefera, or Tulip-tree. Its large solitary flowers have the size and appearance of a water-lily. Its wood serves the carpenter for many of the uses of pine.

Does the Tulip-tree reach to a great size ?

In Canada West, and in the Western States, it often grows to the height of one hundred and forty feet ; but in New England its dimensions are less ample.

What is meant by Solitary Flowers ?

Those which grow singly on a stalk, and not in a cluster, like those of the Laburnum and Catalpa trees.

What trees are they ?

The Catalpa is a native of the Southern States. In the Middle States it is only known as an ornamental tree with leaves of a palish green. It flowers early in July, and has a beautiful appearance. The flowers hang in full white clusters, variegated with purple and yellow.

What is the *Laburnum* ?

The *Laburnum* is a native of the Alps. It flourishes in England, and is somewhat planted in ornamented grounds in this country. Early in June it puts out pendulous clusters of yellow flowers ; these are followed by long, black, seed-bearing pods.

Is the Elm an American tree ?

One species of it is called the American Elm. This is the lofty and graceful tree preferred in many places to all others for ornament and shade. New Haven, in Connecticut, is so abundantly planted with it as sometimes to be called the City of Elms.

Are there many species of Elm ?

There are several, but chiefly the English elm, and the Slippery elm ; the former was imported from England.

How is the English distinguished from the American Elm ?

It is not so large as the American Elm, nor do its branches bend downwards with the ample sweep of the former.

How is the Slippery Elm described ?

The slippery elm is not so large or drooping as the great elm, neither is it so common. Its inner bark abounds in Mucilage, a sort of vegetable jelly ; its wood makes good rails for fences.

Is the mucilage of slippery elm made use of?

Yes; the bark dried in strips is sold in bunches in market and in drug shops. When boiled, the extract of it is applied to sore throats and other complaints.

Are walnuts and other nut-trees indigenous in America?

They are in these States and in Persia. Our nut-trees are not only valuable for their fruit, but for many mechanical purposes. The fruit is covered with a spongy, odorous husk, without spines, which falls off when dry.

Are Hickory-nuts wholesome?

Properly dried, they are sweet, wholesome, and nutritious; but when old, the oil they contain becomes rancid, and they acquire an acrid taste.

Can any use be made of nut oil?

Artists use walnut oil in the mixture of their fine colors. After the oil has been pressed out of a quantity of kernels, the mass left is called Nut-bread, and serves to fatten poultry.

Does the Hickory-tree contain sugar?

Its sap is what is called Saccharine, that is, sweet to the taste, and containing sugar.

Is the nut-tree valuable?

Yes, for many reasons; first for the beauty

of its form and the agreeable odor of its foliage, and especially for its wood, which is solid and may be easily cleft when young.

What are some of the uses of nut-wood ?

It is used for making hoops, in vast quantities, from the young trees. A plantation of young hickories is very profitable when sold for this purpose.

Does this wood make charcoal ?

Nut-wood makes the best charcoal, and the ashes, containing a large portion of Alkali (potash), make excellent Ley for the manufacture of soap. Ley is the liquid extract of wood-ashes.

Does the mechanic use hickory wood ?

Yes ; it makes handles for chisels, gimlets, and augers : the carriage-maker employs it, and so does the farmer.

What use has the farmer for it ?

When he cannot get oak wood he makes of this wood the teeth of his rakes, bows for his yokes, and handles for his axes.

Is the Locust a serviceable tree ?

The Locust is a very picturesque tree, though defended with spines. In the flowering season it is adorned with beautiful Racemes of *white flowers*, tinged with a little yellow ;

these are succeeded by a pod containing the seeds.

What is a Raceme ?

A Raceme is a hanging or pendulous flower or fruit-stalk, with flowers on each side, like a bunch of currants or barberries; both these are Racemes.

Is Locust wood durable ?

This tree is of rapid growth and subject to the depredations of a worm, which eating into it, often produces early decay.

Is this wood valuable of itself ?

It is so durable that posts are often made of locust wood, and so are Tree-nails.

What are Tree-nails ?

They are nails of wood driven into such parts of a ship as require nails, because nails of iron would rust and injure the wood liable to be wetted by sea-water. The best tree-nails are made of locust-wood.

What is the Birch ?

The Birch family consists both of trees and shrubs, and is a native of the colder regions of both continents. Great quantities of birch wood are used as fuel. The Black Birch, the White Birch, and the Canoe Birch are the principal varieties.

What are the peculiar properties of Black Birch ?

Its wood is somewhat used by mechanics, and its inner bark is scented and of an agreeable flavor, particularly that of the young twigs, which are often used to flavor confectioner's Candy.

"The fragrant bark above him hung her tassels in the sky,
And many a vernal blossom sprung and nodded careless by,"

says Mr. Bryant's poem, of a poor man lying dead in the woods. This "fragrant bark" was that of the black birch.



A Canoe.

Does the bark of some birches come off in large pieces ?

The inner bark may be taken off in broad strips and sheets. This birch bark is that *which the Canadian Indians embroider with*

dyed Porcupine's quills of various colors, making of it little cases and boxes for sale.

Are Canoes made of birch bark?

Birch bark is that only which serves the Indian to construct his Canoe of. Great plates of the bark are stitched together with the tenacious fibres of the spruce root soaked in water; these are shaped into canoes.

How is water excluded from these canoes?

When completely formed they are rubbed over with Resin from the Balm of Gilead tree. They are so light that when the Indians would pass from one stream to another they lift the little vessel upon men's shoulders, who carry it whither they will.

What is the space thus crossed called?

It is the Portage. A canoe designed to convey four passengers with their baggage usually weighs from forty to fifty pounds. Some of these canoes are large enough for fifteen persons, and are very convenient to travellers.

Are Willows a numerous family?

They are, and are very useful. Willows are either shrubs or trees, varying from a few feet to eighty or ninety in height.

What situation is most favorable to willows?

Growing naturally in moist situations, by water-courses, they are often lofty trees ; on mountains and dry plains they are for the most part diminutive shrubs.

Where do we most frequently see willows ?

Planted in rows along wet ground. Our common willow has slender twigs of a yellow color, while its leaves of light green, blown by the wind, have a silvery appearance.

Can willows be manufactured ?

Their long pendent branches, called Sallows and Osiers, when stripped of the bark, are woven into baskets, infants' wagons, cradles, and other articles.

How are willows used in the Hebrides ?

A traveller relates that in those islands he "has ridden with a Bridle made of willow twigs ; and lain all night in a vessel at anchor with a Cable of the same material."

What beautiful foreign willow is cultivated in the vicinity of New York ?

That which is called the Weeping Willow ; this tree often grows to great magnitude, sending out thick branches with long sweeping twigs, in great beauty. It does not flourish in the colder climate of New England.

Where was this willow brought from ?

Tournefort, a great traveller and botanist,

brought it from the East to Europe, one hundred and fifty years ago (1702), and thence it was conveyed to the United States.

Is not the weeping willow considered a melancholy tree?

In the Bible it is said of the Jews, captives in Babylon, they "sat under the willows of Babylon and wept;" they wept because they were exiled from their own country. This sorrow associates melancholy with willows.

Does nothing else make the willow expressive of sadness?

The sad idea attached to it, as to the Cypress, has made people plant it near the graves of the dead.

Is the Lime a native tree?

This tree, often called the Linden, is a shade tree of compact form and thick foliage, and bearing very sweet-scented flowers of a pale green. These flowers are so attractive to bees that they will come long distances to rifle their sweets.

Are there many species of this tree?

There are several. In England the limbs of one species, growing upon trees standing in rows opposite each other, are woven together at the ends, forming a sheltered walk.

What is this called?

An alley or bower formed of intersecting

branches is called a "Pleached alley," or a "Pleached bower."

What is the Maple?

The Maple is a numerous family of many species. It is frequently planted along roads in rows for the benefit of its shade, and its greenness so grateful to the eyes. The Sugar Maple affords sugar to the cultivator.

Is maple wood valuable?

No native wood is more beautiful than the Rock Maple; it takes a fine polish and is used in different ways.

What is the handsomest variety of this tree?

It is the Bird's Eye Maple. It exhibits many waves and shades of color in the wood, in which a yellowish brown prevails.

What use is made of Curled Maple, as this variety is sometimes called?

It is used chiefly in the manufacture of house-furniture. Chairs, Bureaus, portable Desks, and frames of pictures are made of Curled Maple.

Can this wood be imitated?

Maple, oak, and other woods are often imitated by painting over cheaper woods, after the colors and wavy surface of the more expensive, and then varnishing them.

Do we cultivate ornamental trees and shrubs?

Many persons, who have ground about their houses, embellish it with hedges, borders, groves, or groups of trees, and often with single specimens.

Can you mention some of these?

The Mountain Ash, the Lilac, the Snowball, and the Althea, besides the Hawthorn, which are all small trees. Of shrubs, there are all the family of the roses, the Syringa, and many more.

What is the character of the Mountain Ash?

The Mountain Ash is a small tree, rarely exceeding twenty-five feet in height. It is of a slender form, sending out its branches almost horizontally. Its clusters of scarlet berries, remaining long upon the tree, make it very ornamental about a house.

Is this tree an American production?

The Mountain Ash is found in the Eastern States and in Europe. It is much cultivated in England, where it is sometimes called the Rowan, or Roan Tree.

Are there any varieties of the Lilac?

There are the white, and the pale purple, growing upon small trees, or high bushes, and a smaller one, very pretty, called the Persian Lilac.

How is this flower described in verse?

“Various in array—now white,
Now sanguine, and her beauteous head now set
With purple spikes pyramidal.”

What is the meaning of “Sanguine?”

This word signifies bloody, or like blood in color; a “sanguine hue,” means of a vivid, red color. The Lilac is not properly of sanguine hue, but of the purple, which is formed of blended Red and Blue.

To what family does the Snow-ball belong?

The Snow-ball belongs to the Elder family. In the month of June, along the borders of pastures, the elder-bush exhibits its beautiful broad heads of clustered white flowers, and in autumn these white flowers are transformed into juicy berries of a garnet color, almost black. The Snow-ball produces no dark berries.

Is the Hawthorn a native tree?

The Hawthorn is a native, both of this country and of England. The Hawthorn is so called from its berries or Haws, and from its spines or thorns.

Does the Thorn grow to great height?

No; the thorn is a low, handsome tree. The flowers of pure white, and the deep green foliage have great beauty; and the scarlet

Haws, which remain on the trees until the birds gather them, give them an additional charm.

Are Hawthorn hedges common ?

They are not common, but are sometimes planted. Hawthorns in a Hedge are not permitted to grow to a height exceeding five feet, but are clipped on the top and sides, exhibiting a compact and regular surface.

Do we adorn our walls and dwellings with vines ?

Yes; with the fragrant Honeysuckle, the delicate Clematis, the profuse Trumpet-flower, the purple-flowered Wistaria, and the glossy leaved Woodbine.

What is a climber much cultivated in England ?

The Ivy is a favorite climber in England; the "ivy-mantled tower" is accounted a more beautiful object for the ivy which covers its stones.

What are Trailing plants ?

Those which run along the ground like the low Blackberry, a delicious wild fruit.

Are there other Blackberries ?

Yes; a large species, called the High-bush Blackberry.

Are Blackberries medicinal ?

When preserved in sugar, or made into jelly, they are used in some diseases.

To what tribe of Plants does the Blackberry belong?

It belongs to the Brambles, the fruit of which consists of juicy seeds, in small clusters, on a receptacle, and having short spines, or briars, on the branches.

What are the Rose Family?

They are an extensive family, not only including the Rose-flower, but a large number of fruit-bearing plants, as the Blackberry, Raspberry, and Strawberry, which are all wholesome and delicious fruits.

Does the Strawberry grow on bushes?

No; but on a short trailing plant, which seems to love the ground, sending out runners that thrust out fibres into the soil; these take root and form new plants.

How does a Strawberry plant resemble the rose-bush?

Their mode of growing is different, but their blossoms are formed alike. If one looks at a strawberry flower, a raspberry flower, a blackberry flower, and a small wild rose, he will see that the flowers, whether pink or white, are formed in the same manner.

What do such flowers show?

Such flowers as the Rose always show that *the plant which produces them is innocent,*

and not in the least unsafe to be touched, and that its fruit may safely be eaten.

Are any plants poisonous ?

The flowers, roots, and oil of some plants are poisonous ; but some of these, made into medicine, taken in small quantities, are given to sick persons.

Are there many varieties of Roses ?

There is a large number ; we all know the Wild Rose, the Red Rose, the White Rose, the Yellow Rose, and the Moss Rose. These are but a few of this great and beautiful family.

What is Sweet Brier ?

It is the plant on which the wild rose grows ; we often see it by the road-side, admiring the graceful curve of its branches, and enjoying the odor of its young shoots, and its modest, natural flowers.

What is the Michigan Rose ?

This Rose, often called the Prairie Rose, is a native American, brought from the Western States, and now cultivated in the Middle and Eastern.

Is the Michigan Rose much liked ?

It is odorless, but much admired for the abundance of its flowers. This Rose is a Climber, and when sustained by a wall, will

spread itself over a large surface, mantling a house with great beauty.

Is the Rose extensively known?

The Rose has been called "the queen of all the flowers;" its beauty and fragrance make it a general favorite. The Greeks cultivated roses, and the Persians and other oriental people, and all Europeans admire and cherish it.

Has the Rose any permanent value?

It has; rose leaves, or petals, when distilled, afford Rose-water, and a perfume called Attar of Roses. Rose leaves, dried and spread among clean linen, give it an agreeable odor.

What is Sumach?

Sumachs are of several varieties. The most common, called the Mountain Sumach, is a beautiful shrub from three to five feet in height, being seeds in long clusters, of a long pointed form, and bright crimson color.

Has the Sumach a splendid appearance in Autumn?

It has; its seeds seem like diminutive balls of crimson velvet, and its leaves, before they fall off, take a similar hue. The Sumach grows on dry and rocky spots, and sometimes on quiet road-sides.

Is any Sumach poisonous?

Yes; one sort, which is the Dog-wood of

swamps, called also Poison-wood, is a beautiful plant, but so poisonous that the effluvia of it often poisons persons who touch or go near it.

How does this poison affect a person ?

It gives him a fever, inflames his skin in great blotches, and makes him very uncomfortable.

What is a very favorite flower after the Rose ?

The Lily. The Lily is known in several varieties ; one, the White Lily, the pride of the garden. This lily puts forth large white flowers ; several on one long stem.

What is the Tiger Lily ?

The Tiger Lily is an orange-colored flower ; the inside of its six petals, being spotted with black, resembling a little the spots of the tiger's coat.

Does the Field Lily resemble this ?

It does. This is supposed to be the Lily our Saviour mentioned in the twenty-eighth chapter of St. Matthew's Gospel, when he said, "Consider the lilies of the field, how they grow ;" and again, "Solomon, in all his glory, was not arrayed like one of these."

Are not a King's robes more splendid than flowers of the field ?

No : the king's robes were made by men,

but the flowers are the work of the great Creator. He contrived them with exquisite skill; he renews them every year; and they will last, in succession, to the end of time.

How does a flower appear when viewed through a microscope?

It is most beautiful; every spot that can be seen with the naked eye, and many that cannot be so seen, display exquisite colors; and all the veins, containing the juices of the flower, are made quite plain.

What is the Water Lily, or Nymphaea?

This is a large flower growing in brooks: it is rooted to the wet soil below the water; this root sends out very long stalks, with broad leaves, and white flowers at the ends, somewhat like a large white rose, often a little tinged with yellow, or pink, float on the surface of the water, and emitting a delicious odor.

What is the largest known flower?

In Demarara grows the *Victoria Regina*, an aquatic plant, bearing a flower fifteen inches in diameter; consequently its circumference measures one yard and a quarter. The green leaves are two yards across.

Has the *Victoria Regina* been brought to this country?

It has: one of these flowers, the property

of a gentleman of Philadelphia, was exhibited in the May of 1852, in New York, at a Flower Show.

What are letters ?

Letters, or written characters, are figures designed to express words, impressed on paper, stone, or any substance that will receive them.

Are not words sounds ?

They are ; but certain letters, when properly arranged, may be understood to mean a word, and many words so formed can be read and understood.

How many letters have we in our language ?

We have twenty-six ; these are of two kinds, Vowels and Consonants. Seven of the letters are vowels, and nineteen are consonants ; these, collectively, are the Alphabet.

What is writing ?

It is the art of making letters and combining them into words.

What is reading ?

Reading comprehends the ability to recognize words and their meaning when written, and enables the reader to repeat to others the contents of any writing, or of a printed book.

Have all languages the same characters ?

No ; the Chinese, Hebrew, Greek, and other languages, have letters in forms different from those of ours.

Who invented English characters ?

The letters of our alphabet are Roman, borrowed from the Latin language.

Where did our figures or numbers come from ?

These are called Arabic numerals. They were carried by the Arabs to Spain, thence to other countries of Europe ; and were lastly brought to this country.

Are writing and reading very ancient ?

Both must have been known fifteen centuries before the birth of Christ, because Moses engraved the Ten Commandments on tablets of stone, expecting they would be read.

Where did Moses obtain his learning ?

He spent his early life in Egypt, where he was instructed in all the learning of the country.

Were the Egyptians in that age a learned people ?

More than any people then existing.

Had the Greeks as much learning as the Egyptians ?

Not at that time ; but afterwards both Egyptians and Phœnicians from western Asia, sent colonies to Greece, and these in time

taught what they knew, and learned much more.

Is there any art more ancient than writing, by which men could communicate intelligence?

There is that of drawing Hieroglyphics, or pictures made to record facts. This kind of drawing might have been practised before the origin of letters.

Have Hieroglyphics been in use in modern times?

In Mexico, little more than three hundred years ago, the people used Hieroglyphics to convey intelligence.

What art is employed to supply, in some measure, the place of writing?

Printing, which fixes words upon paper more rapidly than writing.

What implements are employed by the writer of Epistles, or writings addressed by one person to another?

The materials of the writer are Paper, Pens, Ink, Wafers, and Sealing-wax. Pens were anciently made of reeds, afterwards of quills, and now of metal.

What is Ink?

It is the black fluid used to write with. It is made of galls, of copperas, a mineral substance containing iron, some gum Arabic, and sufficient water to make it liquid.

What are Wafers and Sealing-wax?

Wafers are made of flour, isinglass, and a

small quantity of yeast. Sealing-wax is shellac and rosin melted together, and colored black, red, or green.

What are Lead-pencils?

What we call lead-pencils contain no lead whatever, but a mineral substance called Plumbago; this is found in Cumberland in England, and in the State of Pennsylvania.

Can you describe a Lead-pencil?

It is a cylinder formed of two slender pieces of cedar wood cemented together. In one of these pieces a groove is cut, into which a slip of plumbago is inserted, before the second piece is fastened on the former.

How is the pencil used?

The wood at one end of the pencil is cut away, leaving the plumbago projecting from it, which is then scraped to a point, and serves to write or to draw with. India-rubber, or a piece of bread, will efface pencil marks.

What is plumbago composed of?

Nearly nine-tenths of it are carbon, about one-hundredth part is iron; sand and clay form the rest of this useful substance.

Is Printing Ink like writing ink?

It is of the same black color, but is formed of boiled linseed oil and lampblack. This ink does not penetrate the paper, so as to prevent

both sides of a sheet from taking an impression.

Does drawing resemble writing?

A written word has been said to be the picture of a thought, but a drawing is the picture of an object.

What is a Picture?

A Picture is a painted drawing, but a drawing or an engraving is not properly a picture. A large engraving is a Print, and small ones, such as are seen in children's books, are Cuts.

What is a Portrait?

A Portrait is the painted likeness of a man, woman, or child.

Is painting of many kinds?

There are several modes of painting; as Oil painting, painting in Crayons, in Sepia or Indian Ink, painting in Water-colors, in Fresco, and in Enamel.

What materials are used in painting?

Painters' colors, pencils, chalk, brushes, and the articles painted upon; these last are plates of copper, prepared boards, canvas stretched on a wooden frame, and paper.

Has the Artist no other instruments?

He mixes his colors with oil upon an oval

piece of smooth wood, or of porcelain, called a Pallet; this has a hole in it through which the painter puts his thumb, and holds the instrument conveniently.

Where does he place his canvas or board?

He sets it on a tall frame, on the supporters of which are holes, so that the painting may be lifted higher or lowered by means of pins thrust into the holes. This is the Easel.

Which is the more ancient, Painting or Sculpture?

These arts originated, perhaps, at the same time. Rude attempts at carving different forms are found among savages. Men are imitative beings, and love to represent what they have seen.

Does the Bible mention Sculpture?

The second commandment is, "Thou shalt not make to thyself any graven images, nor the likeness of any thing, nor bow down to it nor worship it."

What does this injunction show?

It shows that men made images and likenesses fifteen centuries before Christ, and that they were idolaters. Aaron, the brother of Moses, made a golden calf in the wilderness for the Hebrews to worship.

What could be the reason they desired a Calf to worship?

Because the Egyptians, among whom they

had lived, worshipped the bull Apis, which must have once been a calf.

How has Painting been defined ?

"Painting is that art of design which imitates objects by color on a uniform surface."

Why is painting called the Art of Design ?

Design means an intention to do something; almost every action requires some thinking or planning. A picture is much thought of by the painter before he draws and paints it; he Designs it first and executes it afterwards.

How are objects at different distances represented on the same surface ?

By Perspective. If in a picture two trees of the same size are drawn, one very near the observer and the other at a distance, the nearer tree will be drawn of a larger size than the more distant.

Why are these trees so drawn ?

Because such is the law of Optics or Vision. If we look abroad, and think of what we see, we shall perceive that near objects appear to us larger than others of the same bulk more distant.

Must the artist study Perspective ?

He must know how much objects are diminished to the eye by distance, or his drawing will be false, not according to nature;

therefore he must study Optics and Perspective.

Did the first artists know these sciences?

No; but as they designed pictures before they began them, and observed Light and the forms of many objects taken together, they learned by degrees the truths since written out in books of science.

What is a Landscape?

It is a picture of some view in the country, exhibiting land and water, trees, houses, cattle, or any objects usually seen upon land. Scope means the space the eye can see over.

What are Marine views?

Marine views are prospects of the Ocean, sometimes in repose and sometimes agitated by storms, often containing ships sailing, or driven furiously by the winds and waves.

What is an Historical Picture?

Every picture consisting of many figures of men or animals is a Composition; if it represents any great action, good or bad, it is an Historical Picture.

Had the Greeks great painters?

The historians of Greece relate that for five centuries before Christ they had many; their

pictures represented the actions of great men, and the fabulous history of their gods and goddesses.

Are any of these pictures in existence?

They are not; but what they were is mentioned in History.

Did painting originate with the Romans?

The Romans do not appear to have been originators of painting. The Greeks from Corinth brought painting on vases into Etruria, and the Romans took paintings from the Greeks of southern Italy, from Sicily, and Corinth.

When did the Romans obtain possession of Greece itself?

Mummius, a Roman general, took Corinth before Christ 147 years. This completed the conquest of Greece. Corinth contained many splendid works of art, which fell into the hands of the Romans; many of these were conveyed to Rome.

Did the Romans understand the value of pictures?

At first they did not. When the Roman soldiers seized and carried off from the houses of Corinth fine pictures, the general told them if they injured or destroyed these beautiful works of art they must pay for them.

Would it have been possible to pay for them?

No. A fine work of art may be sold by

one owner to another, but cannot be replaced if it be destroyed. The loss cannot be paid for.

Did the Romans ever acquire the love of art?

Public edifices had been embellished by some pictures executed in Rome previously to the taking of Corinth, but art was little esteemed among the Romans.

Was this taste never acquired by them?

Rich people acquired it, and adorned their great houses with pictures, therefore there must have been painters to furnish them. In the time of the Emperor Augustus landscapes, garden scenes, and painted walls were ornaments of public baths and private dwellings.

What was the age of Augustus?

Our Saviour was born in the twenty-seventh year of the reign of Augustus. Judea, the native country of our Lord, was a portion of the empire, and his parents paid taxes to the emperor.

Are there any remains of Roman art?

Pompeii, a city of Italy, was buried beneath the lava of Vesuvius for seventeen centuries; the walls of its houses, and those of the baths of Nero at Rome exhibit some ancient paintings, but these are not of much merit.

What is Mosaic?

Mosaic can only be compared to what we call Patchwork, which is made of small pieces of silk or calico arranged in symmetrical forms.

Of what is Mosaic made ?

Mosaic is a sort of picture made of small pieces of fine stone of different colors, often not so large as the head of a pin, and cemented so as to represent men, animals, and other objects.

Do any ancient Mosaics exist ?

Yes, many ; one especially fine, representing a battle, has been taken from Pompeii. Mosaics made into brooches and small medallions for necklaces, are still manufactured in Italy, and are worn by ladies.

Can poor people possess good pictures ?

It takes much time, labor, and skill to produce a good picture, therefore the rich only can purchase them ; but they may be engraved on paper at small cost, so that all persons may obtain some notion of the best pictures.

What is Illuminating ?

Illuminated books are manuscripts bound in the form of a volume, and composed of parchment, or of vellum which resembles parch-

ment. These books are adorned on the title-page, and on the margin of the leaves, with paintings in very bright colors.

What sort of pictures are these?

Illuminated books are generally on religious subjects. The painted figures, which are often partially gilt, are those of our Saviour, of the Virgin Mary, the Apostles, and other Holy men. Sometimes figures of birds and flowers may be seen in them.

Was the art of painting continued in Italy from the time of Augustus?

No; barbarians from Germany chiefly took possession of Italy in the fifth century. They and their descendants either neglected or destroyed whatever was beautiful in the country.

Did not the fine arts revive in Italy?

Yes; early in the thirteenth century, the Italians began to paint with some success, though it does not appear that they imitated the forms sculptured on the reliefs and vases which had not been destroyed.

Did these artists paint in oil?

John Van Eyk, about 1380, was the first who painted in oil. Invention improved from this time; the painters and sculptors employed themselves on religious subjects, and their works were often placed in Basilicas, or churches.

What was the use of these carvings and paintings?

The greater number of people in those days could not read letters, but they readily understood pictures. All persons, however humble they might be, could enter the church and read the Scripture history in the pictures.

What were the subjects of these pictures?

They were often incidents in the life of Christ—such as his infancy in Bethlehem, his Baptism by John, his Miracles and his Crucifixion, besides representations of his apostles, his mother, and his female friends.

Were those pictures very instructive?

This is called Pictorial instruction, and is very useful, giving just ideas of persons and actions that could not else be so well understood. We now have what are called Illustrated books, containing Wood-cuts of different objects, designed to instruct the reader.

Who in Italy brought the art of painting to great perfection?

Raphael, Michael Angelo, Leonardo da Vinci, and Titian. These and some other eminent men are called the Old Masters; and their paintings, Works of the Old Masters.

Were these great men contemporaries?

They were. Leonardo da Vinci died in 1519, the year before Raphael. Da Vinci

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painted the well-known Last Supper, common in this country in an excellent print. Raphael has left very beautiful things in Rome, and some of his pictures are in England and other countries.

Who excelled all the Italian painters ?

Michael Angelo, who died 1563, at the age of eighty-nine. He was at once poet, painter, sculptor, and architect. He painted the chapel of the Vatican called the Sistine, and its walls and ceilings are still the monuments of his genius.

Did Raphael live to the great age of Michael Angelo ?

No ; that admirable painter died at the age of thirty-seven (1520). He was a native of Urbino in Umbria, a duchy of Italy, and is often called Raphael d'Urbino, from his birth-place. His Madonnas are reckoned to be the most beautiful ever painted.

What is a Madonna ?

The word Madonna signifies " my lady." The old masters and the Italians being Catholics generally, had great veneration for the mother of Christ—thence they call the Virgin Mary the " Madonna."

Are there eminent painters out of Italy ?

Painters are divided into what are called *Schools*—as the Roman School, the Venetian

School, the Flemish School, &c. Titian belonged to Venice, therefore his works belong to the Venetian School.

Was Titian a great painter?

He was, and was distinguished by the great men of his time. Many of his pictures still exist. He died 1576, at the great age of ninety-six years. There were other eminent painters of the Venetian school. Tintoretto, who died 1594, was a famous master of this school.

Did the art of painting continue to be religious?

When the Italians began to study the Antique—that is, the Greek sculpture which the barbarians had not destroyed—the artists began to imitate it. These Greek remains were figures, almost naked, of heathen gods and goddesses.

What are these different styles of art called?

The former religious style is called Christian art, and that which resembles the Greek models is Classic Art.

Did the Italians only practise painting?

No; the Germans also created schools of painting. The school of Cologne is the most distinguished. Nuremberg was the birthplace

of Albert Durer, a painter who almost equalled the Italian masters. Durer died 1528.

Who are the most famous modern artists of Germany?

Dannaker, a sculptor, and Cornelius and Overbeck, living painters.

Who was Holbein?

Hans Holbein, of Augsburg, was living in 1500, in Germany, and was an eminent artist. Hans Holbein the younger, also a painter, came from Switzerland to England, where he died, 1554.

Did Holland and Belgium also produce painters?

Yes; these formed the Dutch and Flemish schools. Peter Paul Rubens, who died at Antwerp, 1640, has left in that city a very famous picture, called the Descent from the Cross.

Who was a famous pupil of Rubens?

Antony Vandyke, who executed many beautiful portraits during his residence in England, which yet remain there.

Who was the greatest master of the Dutch school?

Paul Rembrandt. His portraits are among the finest in the world. Rembrandt died 1674. He had many pupils, the most eminent of whom was Gerard Dow.

Who was Teniers?

David Teniers was a Dutch painter, who

- lived to 1690. His style was neither Sacred nor Classical, but Humorous. His pictures are very amusing, representing Dutch people at their work, or in their diversions.

Who were famous painters of landscape ?

Annibal Caracci and Dominichino (Italians), and Salvator Rosa, painted admirable views of nature. Claude Gelée, born at Lorraine, in France, and therefore called Claude Lorraine, has left many very beautiful landscapes.

Who besides Claude were famous in landscape painting ?

Jacob Rysdael, Nicholas Poussin, Salvator Rosa (an Italian), Albert Cuyp, and Philip Wouermans, who executed all scenes in which horses occur with great effect : all of the seventeenth century.

Is there a Spanish School ?

There is one of numerous artists of the sixteenth century, whose works may still be seen in churches of different cities in Spain.

Who were eminent Spanish artists ?

The most eminent Spanish artists were Murillo and Velasquez. Some of Murillo's works are in England, in public and private collections, and are greatly admired.

When did these artists live ?

They both lived in the seventeenth century. Murillo sometimes painted angels and some-

times beggar boys, besides landscapes and flowers ; but whatever he did, he did well.

Is there a French School of art ?

There is a French school, though some eminent French artists have spent the best part of their lives in Italy. Of these was Nicholas Poussin, who died in Rome 1665.

What is a famous picture of Poussin's ?

The Deluge ; a picture of that great rain or Flood which destroyed all men then living, except Noah and his family. This picture is in the Gallery of the Louvre.

What is the Louvre ?

It is a palace in Paris, in which is a great collection of paintings and sculpture. One may walk more than a mile through apartments, the walls of which are covered with pictures.

Can all persons visit the Louvre ?

Except on one day of the week, all persons, high or humble, of decent deportment, may visit the Louvre without paying any fee ; and those who are so inclined are allowed to copy any picture.

Who are the greatest French artists ?

La Sueur, Le Brun, Watteau, and David, of the present century. Besides these are Horace Vernet and Delacroix, now living ; and Leo-

pold Robert, a young painter of great genius, who died in Italy, and left beautiful pictures of Italian rural life.

Are the arts now cultivated in Germany?

In Dusseldorf is a famous school for instruction of painters; and in Dresden and Berlin are valuable collections.

What living monarch is a great patron of the fine arts?

The King of Bavaria. He has made his capital (Munich) most magnificent, by the embellishments of architecture, painting, and sculpture.

Is there an English school of art?

The English have never equalled the most eminent painters of the continent. Hogarth, of the last century, was a very original genius. He is a Moral painter of great skill, exhibiting in his pictures, which are in Series, like the chapters of a book, the end of vice and folly. Hogarth died 1765.

Can you mention other English artists?

Yes; Wilson, famous for landscapes; Gainsborough, for rural scenes; Sir Joshua Reynolds, for portraiture; Sir David Wilkie, a Scotch artist, for humor; and Benjamin West, an American, settled in London, for historical pictures. Some of these are of the last, and others of the present century.

Who are distinguished living artists in England ?

Mulready, McLise ; Leslie, an American ; Stanfield, a landscape painter ; and Sir Edwin Landseer, who excels all other painters in his admirable pictures of animals.

Have some eminent English painters died within a few years ?

Constable, Callcott, Sir William Allan, in Scotland, and the most celebrated of all, Turner, lately deceased, whose pictures now bear an immense price.

Do the Americans cultivate painting ?

We have many native artists, and some good ones. Thomas Cole was a noble historical painter. Robert Walter Weir, of West Point, is an artist of much grace and skill ; and Durand, of New York, is an excellent painter of American scenery. Washington Allston excelled all these.

What is painting in Fresco ?

Fresco is an Italian word, signifying fresh. Fresco painting is the painting of figures on plaster or on a wall, when the wall is damp or wet.

Did the great masters paint in fresco ?

They did. Many of the finest works of *Michael Angelo* and of *Raphael* are painted in

fresco, and are in Rome in chapels and palaces.

What is Enamel painting?

Enamel is a fine preparation of glass. This substance painted on one side, by its transparency admits the figures to the other side. Enamel paintings are usually small, like ladies' larger brooches. This painting is burnt into the glass.

What are water-colors?

Water-colors are formed by certain paint-stuffs—red, yellow, blue, or any color—mixed with water for use, and painted on prepared paper.

Can this species of painting be made very beautiful?

It can. Exquisite flowers can be so painted, and other designs. The English, at the present time, excel in water-color painting.

What are Crayons?

Crayons are a kind of earth—black, white, and red, and other chalky earths—made into sticks a few inches in length. These are rubbed dry on paper in figures designed by the artist.

Are pictures in crayons pretty?

They may be made so by the skill of the painter, but the colors easily rub off, if not put under glass. This sort of painting is also called Pastel.

What is a Miniature?

It is the representation of an object diminished—that is, made much smaller than the natural size, as the head and upper part of a man's person drawn in the space of a few inches, on ivory or paper.

What is Dyeing?

It is the immersion of any substance used as cloth, or any texture, woollen, cotton, or silk, in some liquid which will communicate a new color to the cloth, and to raw silk, to wool, or to cotton yarn.

What colors are so communicated?

All the colors which we see in our garments, our curtains, and our carpets. Painting is laid upon surfaces as upon the painted floor-cloth in our houses. Dyeing penetrates into every thread and particle of the dyed substance.

Did the ancients practise dyeing?

They did, as appears in the Old Testament. The Hebrews were commanded to bring of fine linen "blue, and purple, and scarlet," and also "Rams' skins dyed red," for the Tabernacle.

What was the Tabernacle?

It was a tent which could be set up and

taken down, within which certain furniture and instruments used in the Hebrew worship were kept. The priests only entered the Tabernacle while the Congregation worshipped on the outside.

Of what substance was the tabernacle made ?

The Tabernacle was formed of curtains made of dyed linen, covered over with other curtains of woven goats' hair. All these were spread over supporters which might be moved from place to place.

Did other people in that age practise dyeing ?

Probably they did. One nation, the Phœnicians, whose capital was Tyre on the Mediterranean, were famous for a dye of great beauty, called the Tyrian Purple.

How was the Tyrian purple procured ?

It was a juice contained in a little bag or sac of a shell-fish. This juice also exuded from the shells of the animal, but the quantity so obtained was small, which made the dye very dear.

What was the effect of this high price ?

The cost of it permitted only rich people to wear it. The Purple often mentioned in Roman history was only worn as a border to the white robes of great men, put on in stripes like velvet ribbons in these days.

What is Purple?

It is what is called a compound color. It is a mixture of red and blue. Simple colors cannot be divided into separate colors. The simple colors are Red, Yellow, and Blue. Red and yellow make Orange; red and blue, Purple; and blue and yellow, Green.

Was the Tyrian a true Purple?

No; it was a garnet, or deep rose-color, like fresh blood.

What is scarlet?

Scarlet is red, with a slight addition of yellow. The modern scarlet dye is made of a dried insect called Cochineal. These insects are reduced to powder, mixed with a preparation of tin, and put into water, in order to make this dye.

Where does the Cochineal insect come from?

It is found in Mexico. It feeds on the thickaves of the prickly pear. When in a torpid sleeping state, the insects are carefully removed, dried, and sent to different countries.

Does not this care in collecting make Cochineal very expensive?

Yes; because all labor must be paid for, and the price of the labor is added to that of the article wrought upon.

Were there no scarlet dyes before America was discovered?

Yes; because other substances were employed to make the color.

What was one of those substances?

Madder is a trailing plant much cultivated in England and Holland, on account of its roots, which are used by dyers and calico-printers.

Does madder anywhere grow wild?

Yes; in South America, in the neighborhood of Smyrna, and in the island of Cyprus. Madder is a harmless plant, and when cows eat of it, it gives a yellow tinge to their butter.

Is the madder root red?

When ground to powder, it is yellow; but by exposure to air, it becomes red. Besides, red, madder furnishes a purple, a yellow, an orange, and a brown color to the dyer.

What is Turmeric?

It is the root of an East Indian plant, used in Europe and in India for curry powders, which are a condiment cooked with meats.

Is turmeric used in dyeing?

It gives a fine vivid yellow to silk and cotton; and added to Cochineal, it improves scarlet dye. The leaves of the Saffron flower also afford a yellow color.

What affords a valuable blue dye?

Indigo. This color is obtained from several

plants; but the leaves of indigo supply the best. Indigo is used in dyeing in Europe, Asia, and the United States.

Does indigo grow in all those countries?

Indigo is cultivated in Southern Asia and in the Southern States, whence it is exported to Europe. A small infusion of indigo in water is used in washing white clothes, in order to take out the yellow tinge they often contract.

What is Logwood?

It is a dark red wood used in dyeing. It is brought in sticks about two feet in length from Honduras and some of the West India islands.

What is Woad?

It is the leaves of a plant growing wild in England. These leaves are ground and made into balls. These will then make a blue dye.

Who stained their bodies with Woad?

When people from the continent of Europe first visited the southern part of Britain, now called England, they found the native Britons stained with woad, by way of ornament.

What practice does that resemble?

What is called Tattooing, or marking the person in indelible figures, as is done by the South Sea Islanders. The blue color of woad *will wash off*.

What is Gamboge?

The solidified juice of a tree growing in Cambodia, in the East Indies. It is sometimes used in medicine, but is more valuable in painting, being of a beautiful yellow color.

What is Alum?

Alum is a certain salt sometimes found in the earth, but more often obtained from other substances—from clay and slate-stone.

Is alum a simple substance?

No; it is composed of sulphur, alumina, potash, and water, and can be made artificially. Alum is white, resembling at sight fragments of ground glass, being semi-transparent, or not quite transparent.

What quality is peculiar to Alum?

Astringency. If you put a lump of alum into your mouth, it draws up the pores, and makes the skin feel hard and rough for a short time. This is Astringency—a property of tan-bark and other substances.

Will alum dissolve in water?

Alum dissolves in its own weight of boiling water, but requires eighteen times as much cold water.

For what is alum used?

For many purposes. It is employed in dyeing to fix colors, and aids in dissolving the tin which is used in scarlet dyes. It is rubbed upon leather to make it closer and stronger.

Is it not used for other purposes?

Yes; for hardening tallow candles, and sometimes it is put into bread by bakers, to make dark flour look white.

What is Gum Arabic?

Gum exudes in drops from many trees, and soon hardens in air. The bark of cherry, apple, and plum trees affords gums, which is generally almost transparent, like Amber.

Has gum any medicinal uses?

Gum Arabic has, being used when dissolved with other substances for coughs and colds. This gum, when refined, is white, and, when dissolved in water, serves for paste.

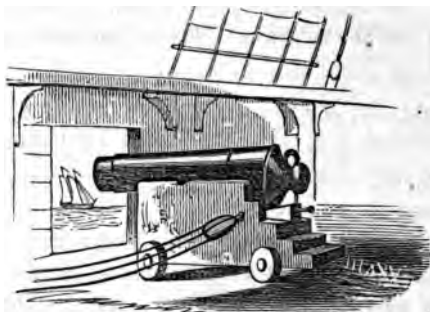
What is Camphor?

It is obtained from the roots and wood of a tree found in China, in Southern Asia, and in the neighboring islands. The roots and wood are boiled, and the camphor condenses in the form we have it. Camphor has a strong odor, said to be repellent to insects.

What are the qualities of Camphor wood?

It is so little destructible, that the Chinese

often use it for coffins. Camphor is given in tincture for a medicine.



A Cannon.

What is Saltpetre?

Saltpetre, or Nitre, is a salt which looks like alum, but has different properties. It is found pure in some countries, but more often in combination with other substances.

What are some of the properties of Saltpetre?

It has a cool taste, and dissolves in its own weight of boiling water. It preserves meat, and is used in packing it for future use. Nitre is also an ingredient of Gunpowder.

What is Gunpowder?

Gunpowder is a composition of Nitre, charcoal, and Sulphur. It is used in fire-arms, in the blasting of rocks, and in the composition of fireworks.

By what quality is gunpowder serviceable ?

By what is called its Explosive force. Gunpowder touched with fire disperses itself violently, carrying every thing before it, often to great distances.

What are Fire-arms ?

Cannon, Guns of different form, and Pistols. A Cannon is a tube, sometimes as large as a man's body, into which a ball is placed, with some gunpowder : a lighted match at the end of a rod is applied to what is called the touch-hole. This fires the powder, and drives out the ball.

What is a Bomb Shell ?

An iron ball filled with powder, which, forced into the air, breaks wherever it falls, committing great destruction, firing houses and throwing down walls.

What are Guns and Pistols ?

They are smaller fire-arms—a gun having a steel tube, called the barrel, fixed to a wooden stock about five feet long. This instrument has a spring, which, being pulled, strikes a hammer upon flint, produces sparks that fire the powder, and drive the shot or bullets with which it is loaded whither the gun points.

Does a pistol resemble a gun ?

It is but a few inches in length, but also

drives out powder and shot. All these are called Fire-arms, because they need fire to put them in action.

What is Blasting rocks ?

It is breaking large masses of stone apart by means of Gunpowder. Holes are bored in the rock, into which the powder is put. The powder is then lighted, and forces the rock into fragments.

Should gunpowder be used with great care ?

It should. Gunpowder can only be kept for common sale in very small quantities, in stores. It is deposited at a distance from houses, in a building called a powder Magazine.

What is the use of gunpowder ?

It helps men to kill each other, and, what is more innocent, to kill wild animals. A man can shoot a wolf, or a mad dog that assails him.

Was gunpowder always used ?

It is supposed that some Germans gave it to the Venetians, and showed them the use of cannon and leaden balls, in 1366. The explosive power of gunpowder was discovered by Swartz, a German monk.

Had the Asiatics any knowledge of gunpowder ?

It is affirmed that both the Chinese and

Hindoes made use of it before Europeans were acquainted with it.

What is Isinglass?

It is a glue made from the sounds and air-bladders of fish. The sturgeon found in the great river Volga in Russia affords this substance.

What is Isinglass used for? •

It is used in fixing and clearing liquors, and in cookery it makes jellies. The sturgeon's eggs, or roe, make a substance called Caviar, which is eaten and much liked by some persons.

What are Edible Bird's-nests?

They are nests of a bird found in the East Indies, made entirely of a substance which, when cooked, is a jelly; and, being seasoned, is used as food and much relished.

What is Ether?

When equal quantities of sulphuric acid and alcohol are heated in a Retort, a vapor rises from the two which may be condensed into a limpid, colorless fluid; this is Ether.

What are the properties of Ether?

Ether has a hot, pungent taste, and a fragrant odor. It is given to relieve distressed

respiration : like chloroform, it produces insensibility to pain.

What is Chloroform ?

Chloroform is a dense, limpid fluid, half as heavy as water, and very volatile. It is distilled from alcohol and chloride of lime. Its vapor, when breathed, produces insensibility, so that severe surgical operations are experienced without pain.

What are Leeches ?

Leeches belong to a family of worms called the Annulose, because they have rings round the body. Leeches have red blood, and relish blood for their food.

Is the leech dangerous ?

No ; he lives in the water, and will suck the blood of cattle who are driven into the pond they inhabit. When gorged, or filled with blood, they will drop off the vein they have adhered to.

Are Leeches useful to mankind ?

In many diseases they are so. It is thought proper sometimes to take blood from a sick person, and the easiest way to do it is to apply leeches to the part in pain.

How does the leech take blood ?

He has in his mouth sixty little teeth ; with these he bites a vein under the skin and draws

out the blood. He is about two inches long. The wound he makes will generally close of itself.

Where are leeches found?

They were once numerous in France and in England, but have become scarce. Russia and Turkey, Sweden, Poland, and Hungary, export leeches to France and England.

Are leeches much in demand?

Four dealers in London import seven millions every year, and three millions are used annually in Paris. In the United States leeches are imported from Europe.

What are Cantharides?

Cantharides, also called Spanish flies, are an insect which, when taken and dried, are used for blistering plasters—some diseases requiring that a blister be raised on the surface of the skin.

Where are these flies found?

In Spain, Sicily, Italy, and the South of France. They are found upon trees in a torpid state, are shaken upon cloths laid on the ground, and thus taken.

Do these insects never recover from their torpid state?

To prevent Reanimation they are tied in bags, and killed by being held over the steam of hot vinegar; they are then dried in the sun.

What is Reanimation ?

Animation is the state of being alive. When a man or animal appears to be dead, if he is restored to activity, he is Reanimated, or Resuscitated. Persons taken out of the water, apparently dead, are often Reanimated.

What is Castor Oil ?

It is an oil used as medicine ; it is Expressed or squeezed out of a plant called *Agnus Castus*. This plant grows abundantly in Nubia, and the natives rub their skin with it to make it smooth.

Does the Castor plant grow in the United States ?

It may often be seen in our gardens, bearing seeds of the size of a small pea. The kernels of these seeds contain the oil. Plantations of Castor are cultivated near New York, and the oil they afford, called *Harlaem Oil*, is remarkably white and pure.

What is Mastio ?

It is a gum brought from Scio, an island of the Archipelago, and from the Levant ; the Turkish women chew it ; they also burn it with other fine gums as a perfume.

What is Sandal Wood ?

It is an aromatic wood found on the Malabar

coast, and burnt for its perfume when dried and cut into short thin sticks.

Is Sandal Wood used in heathen worship?

The Chinese burn it on little altars, before their doors and in their gardens, as an act of reverence to their deities.

Where do the Chinese obtain Sandal Wood?

Much of it is brought from the Sandwich Islands. Some years ago the king of the islands made his subjects work so hard to obtain this wood, that great numbers of them died from excessive toil.

What use did the King make of Sandal Wood?

He sold it to the Chinese, who sent ships to the islands for it. The king, after compelling his poor subjects to collect and prepare it for exportation, took the price of the wood himself.

What is Myrrh?

It is the gum of a tree which grows in Arabia and Abyssinia; it is both a perfume and medicine.

Is Myrrh mentioned in the New Testament?

Yes; when the Magi, certain wise men from the East, perhaps from northern Arabia, visited the infant Jesus, they brought an offering, a present, of "gold, myrrh, and frankincense."

What is Frankincense?

It is a gum which, being set fire to, burns with an agreeable odor. The tree which produces frankincense grows in Syria and Arabia

What is Varnish?

Varnish is a compound of gum, alcohol, and other ingredients; it is laid upon wood, upon house furniture, and also on pictures, to give them a gloss and bring out the colors.

Is Varnish to be used carefully?

Yes; it is very inflammable, and when exposed to fire, unless carefully watched, may blaze unexpectedly and do much harm.

What is Japanning?

It is a hard and durable varnish, often painted in flowers and other figures. It is seen on tea-trays and other articles of Hardware.

Why is this Varnish called Japan?

Because it was first known in Europe upon articles imported from Japan, where it is much used.

What is Hardware?

Hardware consists of articles in domestic use, made of iron, brass, or copper; as iron pots, coal-scuttles, and cutlery, brass candlesticks, copper sauce-pans, and tin measures and pans. We call silver vessels Plate.

What is *Aquafortis*?

Aquafortis is a powerful fluid distilled from a mixture of iron and clay; all metals, except gold and platina, can be dissolved in it; it is useful to dyers.

Of what use is it in dyeing?

It fixes the coloring matter in the cloth to be dyed, or printed in figures. It is then said to act as a *Mordant*.

What is *Copperas*?

It is a mineral substance found sometimes in a natural state, and sometimes it is manufactured. *Copperas*, often called *Green Vitriol*, is used in dyeing dark colors.

Is *Copperas* a simple substance?

No; it is composed of sulphuric acid and iron, and is manufactured by decomposing *Pyrites*, an ore of iron, and adding sulphuric acid. This artificial *copperas* is largely manufactured in the State of Vermont.

What is *Oxalic Acid*?

Oxalic Acid is obtained from certain sour vegetables, as sorrel and the rhubarb plant. When crystallized, it is intensely sour and poisonous. Diluted with water, this acid removes ink and iron stains from linen.

What is *Tartaric Acid*?

This acid abounds in grapes and tamarinds,

and exists in several vegetables, and when collected forms Cream of Tartar.

Does new wine afford this substance?

It does: when wine has stood in a vat, or cask, it deposits a hard crust, or tartar, on the sides of the vessel; this is known as Cream of Tartar.

What is the use of it?

Among other uses it is put into soda-water and soda powders. With hot water poured upon it, it makes an agreeable beverage.

Why does ink make so fixed a stain?

Because it contains iron, which adheres in the form of color, and tends to Disintegrate or rot the material spotted with it, as may be seen in what is called iron-rust in linen.

What is Lac?

Lac is a resinous substance flowing from several plants in the East Indies. It flows out through punctures made by an insect, and this juice, mixed with a fluid derived from the insects, encrusts the twigs of the wood.

In what form is Lac?

The sticks covered with it, when broken off, are Stick Lac; removed in beads, or hardened drops, it is Seed Lac; and when spread into sheets, it is Shell Lac. Lac is used in dyeing scarlet, and in making Sealing-wax.

What is Bitumen?

It is Mineral Pitch; it is a solid, brittle, and inflammable substance, found on the borders of the Dead Sea, hence called the Asphaltic Lake. It is also obtained from the West Indies.

What is Asphaltum?

It is a substance resembling Bitumen. In the island of Trinidad is a lake of Asphaltum, called Tar Lake, which, when first viewed, resembles glass. It emits a strong odor, perceptible at ten miles distance.

Is this Asphaltum a liquid, that it is called a Lake?

Its appearance is that of water; as still water, when it reflects the sun, is sometimes called "glassy water." In hot weather Tar Lake melts, or liquefies, to the depth of an inch.

Is this Lake extensive?

It is three miles in circumference, and circular; the depth is not ascertained.

What is Petroleum?

It is a natural mixture of Asphaltum and Naphtha, a combustible fluid. It is found in wells, a few feet deep, into which it flows.

Is Petroleum made useful?

In some parts of Asia petroleum is used by the natives, both for light and fuel.

What are Spirits of Turpentine?

Spirits of Turpentine is properly Oil of Turpentine. Oils are not always greasy. This oil is mixed with resin in the juice of the pine-tree.

How are Spirits of Turpentine obtained?

By distilling turpentine the spirit evaporates, and is collected in a fluid state; while the resin remains. Resin set on fire, burnt a certain time and then extinguished, is Shoemakers' Wax.

What does the Shoemaker do with this Wax?

He rubs it upon the flaxen thread : by means of it the fibres of the thread adhere, and are made stronger.

What is Natron?

It is a sort of natural soap found floating on the top of certain lakes in Egypt. These, called the Natron Lakes, are six in number. The natron is collected once in a year.

In what part of Egypt are these Lakes?

The Natron Lakes are in the Natron Valley; they extend about sixteen miles, are west of the Nile, and contain common salt.

What use is made of Natron?

It is used, both in Egypt and Syria, in washing and bleaching linens, and in the manufacture of glass.

What is Asbestos?

Asbestos is a silvery white mineral, with slender filaments, which may be woven, and cannot be burnt to ashes.

Where is Asbestos found?

In Scotland, and in the island of Anglesey. The word Asbestos signifies Inconsumable. Asbestos is only made into small articles, as purses and mere curiosities.

What are the great divisions of Animal Life?

Animals are described under four divisions: the Vertebrata, the Mollusca, the Articulata, and the Radiata. All animals having a back-bone, or spine, are Vertebrata.

What animals are these?

The Vertebrated animals are Man, all Quadrupeds, Reptiles, and Fishes; the other three divisions have no spine, nor any bones. The spine is sometimes called the Vertebral column. It sustains the head and limbs.

What are the Molluscos Animals?

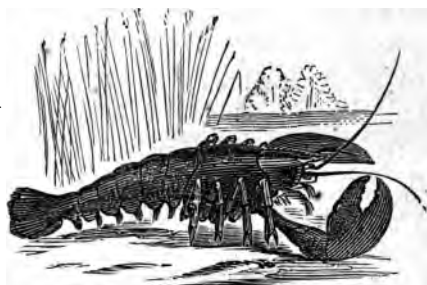
The Oyster, the Clam, and other shelled animals. Shells are Univalve, Bivalve, and Multivalve. Worms, or Vermes, which have no shells, are of this class.

What is this distinction?

Molluscs, as they are called, when Univalve, have but one shell; Bivalves have two, and Multivalves have several.

What is the history of Shells called?

It is Conchology. Some shells are of great beauty. They are composed chiefly of lime, but take a fine polish, and some are spotted with beautiful colors.



A Lobster.

What are Crustacea?

They are Lobsters, Crabs, and other thin-shelled Molluscs: the Crustacea have legs to move with, and claws to seize their prey, but within they have no bones. Their legs are articulated, or jointed.

Where do the Crustacea live?

They live in the water and are Oviparous.

Crabs, when first hatched from the eggs, are very small; they may often be found, half the size of the five-cent piece, in the oyster, which feeds on young Crustacea.

Of what color is the Lobster naturally?

When alive he is of a blackish green, but when boiled he becomes of a very vivid scarlet. His flesh is very good food.

Are Worms of any use?

They are not of much use to mankind, but they may enjoy their lives in their own way. The Leech is useful to the sick; the Red Earth Worm, which we see turned up with the soil, is a harmless animal.

Why are men called "worms of the dust?"

That is figurative language, intended to express that, while we live in this world, we resemble, in some respects, the least of God's creatures.

In what respects do animals differ from all inanimate beings?

A stone is inanimate. An Animal of the lowest form has some Intelligence; he feels that he lives; this is Consciousness. He requires food, desires food, and knows what is proper for him to eat. He eats for Nutrition; to keep himself alive. Most animals can change their place; this is Locomotion: they

also Sleep, and have young ones, which is Reproduction, and they all die.

What, then, are the principal laws of animal life?

Intelligence, Consciousness, Locomotion, Appetite, Nutrition, Sleep, Reproduction, and Death.

Can you explain these?

Intelligence is the power of knowing something, more or less; Consciousness, the feeling that we are alive; Locomotion, the ability to move according to some purpose; Appetite, desire of something.

What do other laws signify?

Nutrition is support of life by means of food; Sleep, suspension of consciousness; Reproduction, producing more of the same kind; and Death, the termination of animal life.

Can you tell what becomes of a dead body?

It returns to its elements. The bones fall to pieces, but they continue to be lime and whatever composes them; all the fluids of the body evaporate; and the solid part, which is very small, returns to the substances of which it was composed.

Do not vegetables require nourishment?

They do, and derive it from the air and soil. The roots convey the principal nourishment.

to the stem, the branches, the leaves, and the fruit; but they cannot seek their own food.

How do animals and vegetables differ?

Vegetables have no intelligence, no consciousness, no power of locomotion. Animals have a mouth to take in food; nerves to enjoy the taste of it; a brain, whence the nerves issue; a stomach to receive it; and what are called organs of digestion to dissolve the food, in order to send it into the blood and keep the feeder alive.

What are Reptiles?

They are vertebrated animals, oviparous or egg-layers, and without hair or feathers. All mammalia, from the elephant to the mouse, have a common structure, but reptiles differ much one from another.

What is a Common Structure?

A common structure means that all those who have it are alike in their organs and functions. They have similar parts for similar uses.

Are the Mammalia all quadrupeds?

No. Man, the highest in this class, is a Biped, he has but two feet; the great Whale is a milk-giver, and has no feet.

Then how have they the same organs ?

They have all a brain, a spine, lungs, and organs to receive and afford milk ; whether large or small, human or brute, this is their common structure.



An Alligator.

Can you mention any Reptiles ?

Crocodiles, Alligators, Lizards, Tortoises, Frogs, Toads, and all serpents or snakes. Some of these have smooth skins, plain or spotted, and others are covered with scales.

What are Amphibious animals ?

The Amphibia can live on the land and in the water. All Amphibia are not Reptiles, as the seal and otter, but many reptiles, as the Alligator, the Tortoise, and the Frog, are proper amphibia, as well as some snakes.

Are reptiles hurtful ?

Many are very dangerous, as the Crocodiles of the Nile, the Copper-headed snake of hot countries, and the Rattlesnake of our Eastern States.

Are the Alligator and Crocodile the same ?

Not exactly ; but Cuvier, an eminent French naturalist, says they are so much alike that they are only varieties of the same family, as a white rose and a yellow one are varieties of one family of flowers.

Are Alligators anywhere numerous ?

They may be seen in countless multitudes in some of the rarely-frequented waters of South America, watching for their prey, basking in the sun, or sleeping on the banks.

Will Alligators attack a man ?

Very rarely, except in defence of their eggs or their little ones. Their principal food is fish.

Where do they lay their eggs ?

In the sand exposed to the sun. They lay from fifty to sixty eggs in one place ; the mother, however, never long quits the vicinity, taking care of the young ones when hatched.

What does she do for her Progeny at first ?

She takes her way to the water, followed by her brood. More than half her eggs have

been eaten by the predacious vulture, which watches an opportunity to pounce upon and devour them.

What is the size of the Alligator when hatched ?

It is about six inches long, while the parent animal is often fifteen feet in length. The Mississippi, the rivers of South Carolina and of Florida, are stocked with Alligators, frequently seen followed by the young family.

What is the Cayman ?

The Cayman, smaller than the North American alligator, is one of the family found in the rivers of South America.

What are Lizards ?

Lizards, shaped much like the alligator, are harmless animals of different sizes, some not more than five or six inches long, and natives of hot countries. It does not appear that the lizard is amphibious.

Is the lizard an offensive animal ?

Lizards often frequent houses in the East and West Indies, and are favorites in families. One sort is readily tamed, eating and drinking from the hand of any person. It pines and dies in confinement.

Are lizards found in Europe ?

This pretty and graceful creature may be

seen in some parts of England, Scotland, and Ireland, but not on the continent.

What do lizards feed upon ?

They subsist chiefly on Insects. The lizard comes out of its hiding-place when the sun shines, watches for its prey, and when it sees an insect darts upon it with its little sharp teeth, and instantly swallows it.

Does the lizard lay eggs like the Crocodile ?

No, the lizard produces the young ones alive; generally from three to six, which soon run about and take care of themselves. It is Viviparous, producing young ones alive, and not eggs.

What is the Boa Constrictor ?

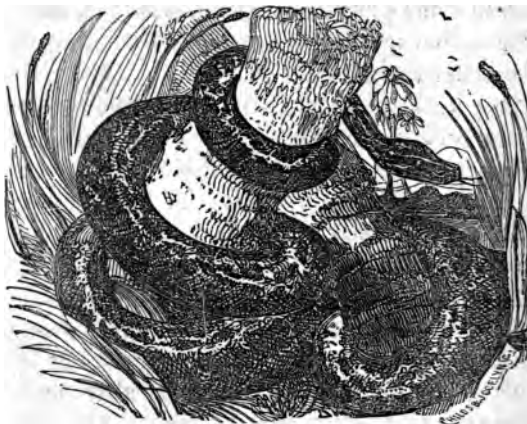
It is an animal; the largest and most formidable of the serpent kind. Some of the species are thirty and forty feet in length. The Boa can swallow a goat, a sheep, or a deer, whole. .

Does he take it into his mouth at once ? .

No, he darts himself at his victim, winds himself round it, and kills the animal by Constriction; that is, he squeezes it to death.

Does he then swallow the animal ?

A gentleman once saw a Boa two hours and a half swallowing a goat, and afterwards



The Boa Constrictor.

he took no food for three weeks. The Boa does not Masticate or chew his food.

Of what country is he a native?

He is found in Africa, in Borneo, and the island of Java. He feeds both on fish and flesh. He will coil his tail round the branch of a tree, and precipitate himself upon an animal which seeks shelter under the tree.

Where is its Domicile or place of abode?

Always on the borders of lakes, rivers, and swamps. It will dip down from the trees upon animals that come to drink, and seize fishes in the water.

Can any Boa be seen in England ?

The Boa is kept in the great Menagerie of the Zoological Garden in London. He is in a strong cage and may be viewed safely. He is fed with rabbits and fowls, and seems to have no objection to hair and feathers.

Is the Boa venomous ?

No. Venom is a poison contained in the teeth of certain serpents, which, when the animal bites, is squeezed through minute holes in the teeth, and poisons the person bitten.

What is the effect of poison so imbibed ?

It enters into the blood of the bitten person, causes inflammation, and, at last, Death. The Boa has no venom. He is sometimes called the Python.

What snakes are poisonous ?

The Copper-headed snake, the Rattlesnake, and some others besides.

What is Hibernation ?

It is the deep sleep into which some animals fall, and in which they continue in the cold season of the year. They cannot then feel the cold, and can live without eating.

Where do the hibernating animals keep themselves ?

Some dig holes in the ground, line their little domicile with leaves, and store it with nuts and other provisions before winter com-

mences. This is done to afford them food when they shall awake.

What animals do this ?

The Marmot and the Hamster, in Switzerland. They lose their fat in winter, come out very lean in spring, recover their spirits and their flesh in summer, and in autumn make ready for winter.

Where do other animals then keep themselves ?

Bats retire to caves, to the hollows of old trees, or to uninhabited buildings, where they may be seen hanging in clusters. They hang by means of little hooks on their leathern wings.

Where are frogs in winter ?

Frogs congregate at the bottom of ponds, lizards hide in the clefts of rocks, and snails adhere to the walls of cellars and other places. Spiders and flies find secret crevices for the winter, whence they issue in spring.

Is the migration of Birds very regular ?

Yes ; we are told in the Bible that "the Stork in the heaven knoweth her appointed time, and the Turtle, the Crane, and the Swallow observe the time of their coming." These appointed times are the departure and return of birds.

What bird is the Turtle ?

It is the Turtle-dove, a wild pigeon which is migratory. The domestic pigeon being sheltered and fed, remains all winter near the family that provides for him.

How are birds described ?

Birds are Vertebrated ; they are Oviparous, and with some exceptions the female sits upon her eggs and brings out her brood of little ones, not forsaking them until they can provide for themselves. Sitting on eggs with intention to hatch out young birds, is Incubation.

Are birds formed alike ?

They are all alike in some particulars. All have two wings, two legs, a horny bill, and a body covered with feathers.

Have birds teeth ?

The Bill or Beak of birds serves all the purposes of teeth, with which they are not supplied. The human mouth has the teeth set in the upper and the lower jaw ; the two parts of a bird's bill are the upper and lower Mandible.

Does the Bill serve many uses ?

It seizes and bruises their food ; it serves for a hand in carrying ; it is the instrument

for cleaning and dressing their feathers, for building their nests, and for attacking their enemies.

How are the bones of birds formed ?

They are light and thin, and contain air which makes the bird light whenever he flies. His wings, the spread feathers of the tail, and the small weight of his body, enable him to float easily in the air.

Are all birds of equal lightness ?

No: the Ostrich has a heavy body and short wings ; she can hardly fly at all, but runs rapidly flapping her wings as she courses along. Domestic fowls have short wings and heavy bodies, and can only take short flights.

Where do birds usually live ?

Generally on trees and bushes ; the Lark builds her nest in the grass, and what is called the Bank Swallow makes hers in the soft soil on the sides of hills.

Where do Aquatic birds make nests ?

Aquatic birds swim in water, and build their nests upon little islands in rivers, and among rushes on the borders of streams. The Swan, the Wild Duck, and the Coot, are aquatic birds.

What is the food of birds ?

Birds that live on flesh are Carnivorous, as

the vulture; those that subsist on grain are Granivorous.

Are birds useful?

They are in various ways. They feed on worms, on caterpillars, and insects, which would be injurious to the leaves and fruit of trees. Some destroy mice, while others feed on seeds and grain.

Are they beneficial in other ways?

Yes; their songs delight us, their feathers and down add to our comforts, and the flesh of many is wholesome food.

Have birds different characters and habits?

Yes: some are domestic and others predaceous; there are the solitary and the gregarious, the ferocious and the peaceable; the large and the diminutive, the disgusting and the beautiful; the harsh screamer and the sweet singer. Every bird has its own particular voice.

Are birds found everywhere?

Yes; in town and country; in the woods and fields; in the desert and solitary place; in the bright tropic land, and in the cold Arctic ocean.

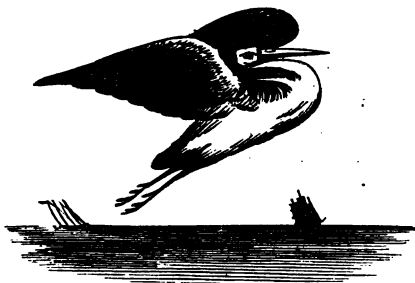
Are domestic birds Carnivorous?

No, they are Omnivorous, will eat almost any thing. Their principal food is grain, but

they feed on insects also, and will take a little meat prepared for them.

Is a bird's nest ingeniously made ?

It is made, with great industry, larger or smaller as the birds require ; securely placed that it may not fall, impervious to rain, and soft within, as a comfortable abode for unfledged birds.



A Stork.

Are birds ever destructive ?

Birds are sometimes injurious ; some peck ripe fruit, others, such as the Vulture and the great Condor of the Andes, seize and devour colts, calves, and sheep ; but the mischief they do is much less than the services they render to mankind.

What birds are especially serviceable ?

A sort of Vulture, sometimes called the.

Scavenger, known in the East, clears the streets of cities of such offensive substances as might else produce disease.

What is the Stork ?

The Stork is so useful that some people think she is a special blessing from Providence. In summer Storks may be seen in great numbers in the cities of Holland. They will eat rats and mice, and many things that would be injurious in towns.

Is the Stork friendly to his benefactors ?

He approaches their dwellings after his winter migration as if he expected to find a home. The Hollanders erect a false chimney, and the Germans a platform on their houses, to receive these welcome guests.

Is the Stork a large bird ?

He belongs to a family called Waders, because they walk into the water to take fish. They have long legs and long necks and bills. Some measure two and a half feet from the tail to the bill.

What is the last class of Vertebrata ?

Fishes. These dwell only in the water, and differ from the preceding classes in their mode of breathing ; they have no lungs, but breathe

by means of Gills. These are fringes on each side of the head.

Can fishes live under water ?

Not very long ; they must come to the surface for air to breathe. Without breathing they cannot live.

Are fishes injurious to man ?

One especially is—the terrible Shark. This is a large fish infesting certain coasts. A man who falls into the water, or one who is swimming, is liable to lose his life or a limb, by the jaws of this great blood-thirsty fish.

What is their general character ?

Many are gregarious, and seem to be social and playful. They may be seen at sea in Shoals or flocks, sporting together, and chasing one another.

Are fishes predaceous ?

Most of them are—the larger feeding on the smaller. Providence has made them so to subsist, but generally they are gentle and beautiful creatures.

What does their beauty consist in ?

In the elegance of their shape and movements in the water, and in the brilliant tints of the scales which cover them ; sometimes gold-colored, sometimes silvery, and often of the finest hues of blue and purple.

How do they make their way through the water?

By means of their fins, which contain bones arranged somewhat like fan-sticks, and connected by Membranes or skins. The Dorsal fin is on the back, and the Lateral fins at the sides.

Are fish produced alive?

The Whale, the Narwhal, and the Dolphin belong to the class Mammalia, and produce the young alive, but other fishes are produced from eggs.

What are fishes' eggs called?

Their eggs or roe is Spawn. A single roe contains hundreds of thousands of eggs. Fishes swim vast distances to deposit their eggs in sand or gravel, where the sun hatches them.

Does this immense number of eggs come to maturity?

Some are devoured by fishes of other kinds, and many of the young fishes become a prey to other fishes. Those that live—the young fry, as they are called—provide for themselves as soon as they can swim.

What fish is esteemed a great luxury for the table?

Salmon, either fresh or smoked. A large salmon weighs fifty or sixty pounds. The salmon is taken in rivers.

Are herrings numerous?

Herrings, in the warm seasons, float in vast

shoals into the ocean from the arctic seas, and are caught in abundance, and salted. They are wholesome food, whether eaten fresh, pickled, or smoked.

Are mackerel very abundant in the ocean ?

They are. The mackerel fishery is a profitable business. Hundreds of thousands of barrels of salted mackerel are consumed every year in the United States.

Where are Cod taken ?

Near the island of Newfoundland, in the Atlantic Ocean. Salted cod is a common article of food.



An Insect.

What are articulated animals ?

Those which have joints in their limbs, and no bones. These are Insects. They have wings, but no lungs. They breathe through little holes in their bodies called Spiracles.

Why are they called Insects?

Because they appear to be cut almost into three pieces. A section or Segment is a part cut off or divided from other parts of a thing. Such a portion is the section of a whole.

How are insects defined?

As articulated animals, possessing six legs, two antennæ, two wings, and sometimes two pairs, two eyes, and often more, a small brain, oviparous, and attaining to the adult state by metamorphosis—that is, change of form.

Into what sections is the insect divided?

Into three—the Head, the Thorax or chest; and the Abdomen (the lowest and largest of the three).

What are Antennæ?

The Antennæ are little threads, sometimes not thicker than a hair, which project from each side of the head near the eyes. Antennæ may be longer or shorter, and are jointed.

What is the tongue of insects?

The tongue of insects may be called a Proboscis or trunk. Many insects feed on honey and other fluids, and the proboscis serves as a pump to draw up vegetable juices from the flower-cup or tube.

What does the butterfly's proboscis resemble?

It is curled up like a spiral wire, and is uncoiled when the insect intends to get his food from flowers.

Is a fly's proboscis like a butterfly's ?

A fly's proboscis is like a club ; he thrusts it out of his head and imbibes a few particles of sugar and of milk whenever he comes in the way of them.

What has he been called ?

"Busy, curious, thirsty fly;" and in this character flies are very troublesome ; but they do some good in the world. These little scavengers devour substances that might corrupt and become hurtful.

Does the proboscis perform any office except feeding ?

It serves the musquito for a sheath to his sting, and other insects for a gimlet or borer. By means of it they make holes in trees, in wood, and even in mortar.

Do insects fly fast ?

It is astonishing how fast they will fly. A few flies will accompany a horse at full gallop.

Have insects never more than six feet ?

They generally have no more ; but some have eight, twelve, and even as many as a hundred.

Are insects ever destructive ?

They are often very much so. A certain

fly will devour whole harvests of wheat; grasshoppers in immense numbers will destroy the pastures for cattle, and flights of locusts in millions will darken the air, and consume every green thing where they alight.

Do these calamities occur frequently?

Very rarely. In Africa and the East, the locust is sometimes a dreadful scourge to the inhabitants; and the Hessian fly sometimes destroys the wheat in our fields in this country.

Are insects gregarious?

The bee, wasp, hornet, ant, and locust are so, and some others. The Termites, an Ant of hot countries, collects in millions, forming hills, divided within into galleries and cells for keeping provisions, depositing eggs, and cherishing the Larva.

Are insects of various sizes?

They are from the largest Beetle to those diminutive creatures which are of the length of a fiftieth part of a common pin; but each and all have perfect organs, and enjoy their little lives.

Are insects found in every place?

They are. Every leaf, every pool, every bank of every stream, with its flowers, contains insects, and they also make visits to our

houses. These all know where and how to procure their food.

How are insects useful?

They are so in what they destroy, for the most part. They constitute the food of many birds and reptiles, and they afford some valuable products.

What are these products?

The silk of the *Bombyx-mori*, the lac of the East Indies, the honey of the Bee, the dye of the Cochineal insect, and the medicinal virtue of *Cantharides*.

Are locusts ever used as food?

They have been so used in the East, for of John the Baptist it is said, "His meat was locusts and wild honey."

Are spiders insects?

We call them so, but naturalists call the spider *Arachnida*, because her structure and habits differ from insects generally.

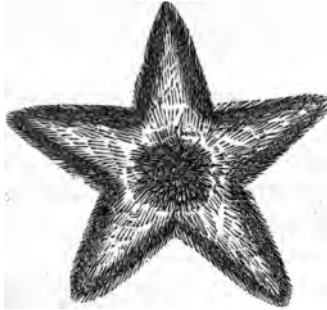
How do spiders differ from insects generally?

Spiders have no antennæ, nor any wings. They have eight eyes and eight legs, and are not subject to transformation. Spiders are of all countries.

Are they ever dangerous to life?

In hot countries, some of this species are large enough to cover the palm of one's hand,

are hairy, and their bite causes inflammation. Spiders are carnivorous, they feed on flies, and their cobwebs serve to ensnare their unwary victims.



Starfish.

What are the Polypi?

Animals which belong to water. They are often attached to rocks, though sometimes floating about, and have no limbs. One species looks like a flower, and is called the Sea-anemone; others look like a mass of Jelly.

On what do the Polypi feed?

On substances floating in the water, marine plants, and diminutive animals supplied by the same element.

Of what use are the Polypi?

We do not know all the uses of God's crea-

tures,*but sure we are that he has made nothing without benevolent design.

What is a Star-fish?

It is not a fish, though called so; it is a stellate or star-shaped animal, and lives in the sea. He is said to be an enemy of the oyster, entering his open shell, and sucking him to death. The Star-fish is one of the Radiata.

What do you understand by Radiation?

Rays are lines diverging from a centre. The hub of a wheel is a Centre, and the Spokes are so many rays. Radiated flowers like the Aster are common.

What are the parts of a radiated flower?

The centre or disk, and the petals or flower-leaves. The petals Diverge or point in different directions from the Centre or Disk.

What are Zoophytes?

Zoophytes include Polypi and Madripores. These are the marine animals which form Sponges and Coral reefs. The proper name of the builders of Coral reefs is Lithophyte.

What are the most useful draught animals in all countries?

Horses, asses, and mules, wherever they are known and can be sustained; Camels in Arabia; Llamas in Peru; Elephants and Buf-

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They cut down trees of a certain size, drive the trunks into the earth, interweave the branches atop, and fill up the open spaces with clay, leaving an opening to pass in and out. They have no doors, chimneys, nor windows.

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It looks like an inverted bowl, being a regular dome in shape. It is entered by a hole like the mouth of an oven, about three feet high, and those to whom it belongs creep

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Carthage was one ; and in Barca, and all along the coast of Africa, great ruins of cities are still found, upon the Mediterranean.

What was Egyptian Architecture ?

The modern Egyptians live in houses without windows towards the street, while the poorer sort of people have comfortless dwellings, but live much in the open air.

What edifices erected by the ancient Egyptians still remain ?

These are chiefly vast temples, palaces, and pyramids, built of stone. The temples were designed for their idolatrous worship, and are ornamented with many images ; frequently with figures of the bird Ibis, which they held in great veneration.

For what were the Pyramids designed ?

It is supposed that they were places of interment for princes, ancient kings of Egypt, and their families.

In what part of Egypt are the Pyramids ?

They stand in a sandy tract along the Nile ; they are forty in number, being smaller and larger, and extend, from the first to the last, about fifty miles.

Which is the largest of the Pyramids ?

That of Cheops, about five miles from Cairo.

It is five hundred feet in height, seven hundred and twenty feet on each side of the base. It is ascended by steps to the summit, which consists of nine large stones, each of the weight of a ton, it is presumed.

Of what are the pyramids made?

Of hewn granite and limestone on the outside. The Pyramids have been entered by curious travellers, and they have found long and intricate passages in them.

Are any ancient tombs existing in Egypt?

There are grottoes and excavations which were used as places of interment. These are now inhabited by poor Arabs glad to be sheltered anywhere. The halls contained in some of these excavations were adorned with paintings and statues.

What do these pictures and sculptures exhibit?

The employments of the people, their funerals, their domestic animals, and the navigation of the Nile.

What is Hindoo Architecture?

It consists of temples dedicated to Hindoo gods, and excavations in the solid rock containing curious images carved in stone. The most famous of these are at Elephanta, at Salsette, and Ellora.



A Pagoda.

Where is Elephanta ?

It is an island seven miles from Bombay, a city on the western side of Hindostan. The island is so called from the figure of an elephant, the size of life, carved in stone in a cave of the island.

Is this a natural cave ?

No ; it is a temple one hundred and twenty feet long, cut in solid stone, containing three rows of columns, and along the sides fifty statues.

Whom do these statues represent ?

They represent the hideous deities of the country ; they are from twelve to fifteen feet high, and have each three or four pairs of hands.

Are there other similar works of immense labor?

There are others of greater magnificence in the island of Salsette, and at Ellora; the former contains sculptured elephants, tigers, and other animals; the latter splendid temples, divided into many apartments, all hewn out of solid rock.

What is the Temple of Juggernaut?

A temple of great magnificence consecrated to an idol. It is resorted to every year by multitudes of worshippers; the domains of this temple feed thousands of cows, which the heathen people regard as a sacred animal.

What is the domestic architecture of Hindostan?

Those who can afford the better sort of houses live in such as are made of bricks, burnt or dried in the sun; the poor people construct slight habitations of bamboo.

Do the Asiatics live in high houses?

Not usually. The houses of the rich are built round courts, and cover a large space of ground. In hot countries houses which are not high, and which have large Verandas, such as we call piazzas, are more free of the heated air which rises above them.

Are there very curious buildings in China?

The Pagodas are temples consecrated to idols. Temples are called Pagodas from Hin-

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Where do the worshippers assemble ?

In the Court, an inclosed space surrounding the pagoda. The lower part of the pagoda consists of a porch, a vestibule, and a sanctuary.

What is a Sanctuary ?

It is a sacred or holy place ; a place of worship. One apartment of pagan temples only is the Sanctuary ; in that is the image of the idol. The Bonzes, or Chinese priests, often have their habitations, which are little cells, near the pagoda.

Are there remains of ancient architecture on this continent ?

Yes, both in Central America and in Mexico have been found immense structures of stone now neglected and overgrown with wild plants.

What do these edifices display ?

All these edifices show great labor and skill in the preparation of the bricks and stones of which they are made, and also in the forms in which they are disposed.

Do the present inhabitants know what was the design of these buildings ?

The descendants of the Aborigines know not when they were erected, nor for what use. The present population of those countries is chiefly Spanish.

What was the Grecian architecture ?

What we principally know of it is the remains of ancient temples and theatres. The Grecian architecture is known by its order that is, by the form of its pillars. The orders are the Doric, the Ionic, and the Corinthian. To these have been added two more, the Tuscan, which is Italian, and the Composite.

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They generally consisted of two stories, the upper for the women of the family, and the

r for the men. On the roof was a plat-, which served the family for taking the air without going abroad. A Dog was in the court to drive away thieves.

What was the Roman architecture?

It was partly imitated from the Greeks. Romans conquered Tarentum in southern Italy B. C. 272; they took Syracuse, a Greek city in the island of Sicily, B. C. 212, and made themselves masters of Corinth B. C. 147. In these cities they became acquainted with and possessed works of Grecian art.

What are Roman remains?

Public roads, Aqueducts, Temples, Theatres, Bridges, and Thermæ, or Baths, and Cloaca, or great Sewer of Rome.

Are these remains confined to Italy?

No; the Romans were at first, seven hundred years before the birth of Christ, only a small people dwelling on the banks of the Tiber; but they increased their possessions to a vast extent.

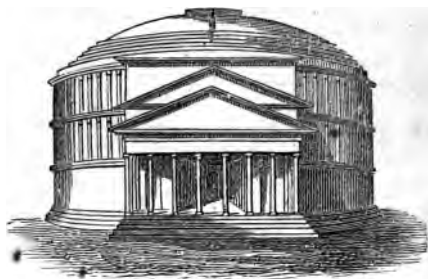
How was the Roman empire increased?

The Romans sent armies and ships of war into different countries, and one after another secured possession of all the territory from

Britain to the Euphrates; excluding Russia and all the northern countries of Europe.

What was the effect of these conquests?

Wherever the Romans possessed the territory they sent soldiers to keep the people under the Roman Rule, and collected Taxes or Revenue every year from the conquered countries.



The Pantheon.

Did the Romans thus do any good?

They taught ignorant people useful arts, made good roads, instructed barbarians in the Latin language, established schools, and erected public buildings wherever they might be useful.

What did they learn themselves?

When they conquered well-instructed people, as the Greeks were in all places where

they resided, the Romans learned whatever was desirable for their own improvement, and thus they learned the Greek architecture.

Did the Romans imitate the Greeks exactly?

No; they adopted what suited their wants and their taste. The most remarkable remains of the ancient Roman architecture in Rome are the Aqueducts, the Coliseum, and the Pantheon.

What are the Aqueducts?

Our aqueducts are pipes laid under the surface, those of the Romans were entirely above ground. They were laid upon arches in succession, were fifty and sixty miles in length, and conveyed abundance of pure and wholesome water to the great and populous city of Rome.

What is the Coliseum?

It was an amphitheatre,—a circular building of stone, erected to contain eighty thousand spectators, witnesses of fights between men whose business it was to attack and kill each other if they could. These were the Gladiators.

Did they not also exhibit fights of wild beasts?

Yes; they sent to Africa for lions and tigers, and set them upon one another; these were “*butchered to make a Roman holiday.*”

Who built the Coliseum?

The Emperor Flavius Vespasian, A. D. 72, when he returned home after his wars in Judea. It was called, in honor of him, the Flavian amphitheatre.

What put an end to these cruel sports of the Roman people?

The Christian religion. While most of the citizens of Rome continued to be pagans, from the time of our Saviour there were Christians among them. The Christian ministers at length persuaded the people that it was wicked and cruel to find their pleasure in the pain of man or of brute creatures.

What is the Pantheon?

It is now a church in Rome, called St. Mary's of the Rotunda. The walls are many feet in thickness, and the area or inclosure within these walls is one hundred and thirty-two feet in diameter; the height from the floor to the top of the dome is also one hundred and thirty-two feet, and the walls sixty feet.

Is the Pantheon square?

No, it is round, and thence called the Rotunda, but it has a portico in front of it of sixteen Corinthian columns. The shafts are of red granite, the pedestals and capitals of

white marble. The light is admitted through a circle in the dome twenty-seven feet in diameter.

Why was this edifice called the Pantheon?

Because it was, when first built, dedicated to all the gods of Rome; it contained statues of all these divinities: of them it was deprived by barbarians who ravaged Rome in the fifth century.

Were monuments erected in Rome in honor of great men?

Yes, there were triumphal arches, columns, and Mausoleums.

What is a Triumphal Arch?

It is a heavy arch of stone extending over a street or road, having supporters on each side; it is many feet in thickness. Upon it are carved various figures to celebrate the actions of some hero. The arch of Titus represents the captive Jews and other objects which Titus took at Jerusalem.

What is the most remarkable column in Rome?

Trajan's pillar; it is a column of marble, the pieces of which are fastened together by bronze; it is hollow within, and contains winding stairs by which it may be ascended; upon the top once stood the statue of the Em-



A Triumphal Arch.

peror Trajan, though St. Peter is now in his place.

How high is Trajan's pillar?

It is one hundred and twenty-eight feet high, and at the foot measures eleven feet in diameter. Upon this pillar are sculptured figures of the different people, dwellers on the Danube and in Western Asia, whom Trajan conquered.

What may be learned from this column?

The dress, arms, and general appearance of the people in the first century after Christ, represented on the column.

What is a Mausoleum?

It is a splendid tomb erected to celebrate some deceased person. The tomb of Cecilia

Metella, at Rome, is ninety feet in diameter, and is circular. She, who was interred there, was a lady of the Crassi family, but otherwise unknown.

Are there remains of Baths in Rome?

There are several, once extensive and magnificent. These baths were for use of the rich particularly, and were very costly. They were called Thermæ. Gardens were attached to them, and paintings adorned the walls.

Was the domestic architecture of Rome splendid?

While the Romans were a poor people they dwelt in humble habitations, but when they became wealthy, the rich had magnificent country houses called Villas; one proprietor having six or more such Villas, and a marble palace in Rome besides.

Had the Romans slaves?

Yes, white men and women in great numbers, sometimes prisoners taken in war, and sometimes children of slaves. Many of these were employed in erecting or in taking care of their grand houses.

What is the most magnificent building in modern Italy?

St. Peter's Church in Rome. Michael Angelo was one of the architects of this edifice; it was begun in the sixteenth century, and was more than a century in building, at a cost

of many millions of dollars. The façade of St. Peter's was finished 1640.

What is Arabian architecture ?

It is that of public buildings, either Mosques or Palaces, which have been erected by Mahometans in different countries since the seventh century.

What are the Arabs called ?

The Arabs who live in the country, and labor in different ways there, and who dwell in tents, are often called Bedouins. The early followers of Mahomet, who conquered the Barbary coast and settled there, were the Saracens; and those who went over to Spain from Morocco were the Moors.

Were the Moors in Spain an industrious people ?

Like the Arabs of Bagdad in Asia, they were ingenious, industrious, and acquainted with the mathematical sciences ; they became wealthy, and erected buildings of great magnificence.

Where were these edifices ?

Chiefly in Damascus, Bagdad, and Cairo. The Moorish kings of Spain erected a magnificent mosque in Cordova, and the Alhambra, a splendid palace in Granada. The Alhambra is still admired by all who behold it.



A Mosque.

How may a Mosque be known ?

By its Dome on the top, and by its Minarets or slender spires ascending from angles of the walls. The mosque of St. Sophia in Constantinople is the grandest in the world.

What is Byzantine architecture ?

The ancient name of Constantinople was Byzantium, and the architecture peculiar to that region has been imitated in different countries of Europe.

What is Gothic architecture ?

The Goths were barbarians from Germany, who took part of France and Spain, and occupied the latter country for ages. In time they became peaceable, industrious, and wealthy, and built churches and houses in their own

way. The Gothic architecture is so named from them.

Did the Goths invent this architecture?

It is supposed that they did not, and that it should be called Pointed architecture. It is, however, known best as Gothic architecture.

What is one feature of Gothic architecture?

The pointed arch is one feature of Gothic architecture, as seen over doors or windows either of houses or churches. In Gothic churches the pillars are tall, often run up to the roof of the building, and are carved to resemble several poles bound into one column.

What is a groined ceiling?

When arches supported by Gothic pillars cross each other, the ceiling so formed is groined.

What is Ecclesiastical architecture?

That of Churches. The great churches of Europe, called Cathedrals, and all smaller buildings designed for the worship of God, are specimens, in different forms, of Ecclesiastical architecture.

Who introduced the structure of Cathedrals?

Not any single person perhaps; but from the tenth century in Europe, and for many years after, certain ingenious mechanics



A Church.

formed themselves into companies of **Masons** in order to construct religious houses.

Did the **Masons** of all countries know each other?

They had **Signs**, that is, movements or marks, by showing which a German mason would be known to another in France; and a French mason would likewise be recognized in Holland or in England, so that they were friendly to each other wherever they might meet.

Did these **Masons** construct all churches alike?

They were formed in the shape of a cross, and adorned with towers and spires without, with carving of wood and stone within, besides beautiful windows of painted glass, and often with fine pictures.

Which are some of the grandest Cathedrals in Europe?

St. Peter's in Rome; St. Paul's in London; York Minster in the city of York, England; Notre Dame in Paris; Strasburg Cathedral; the Cathedral of Cologne; and St. Stephens in Vienna. Salisbury Cathedral has the tallest spire in England.

What remarkable specimens of architecture are there in New York.

Trinity Church in Broadway is Gothic; the Dutch Reformed Church in La Fayette Place is Grecian, though disfigured by a steeple not in harmony with the form of the building; and the Tombs, a prison in Centre-street, of Egyptian architecture.

INDEX.

	PAGE.		PAGE
Aggregation.....	243	Arson.....	98
Agriculture.....	24	Artificers.....	164
Agriculturist.....	147	Artisans.....	164
Air.....	15	Artists.....	164
Alabaster.....	161	Asbestos.....	363
Alcohol.....	66	Asphaltum.....	361
Alkalies.....	187	Astronomy.....	14
Alligators.....	369	Athenian Houses.....	396
Allspice.....	71	Athens.....	160
Almonds.....	79	Atmosphere.....	13
Alphabet.....	322	Augustus.....	331
Althea.....	314		
Alum.....	348	Bamboo.....	275
Amalgamation.....	189	Banjan-tree.....	274
Amber.....	127	Bananas.....	79
American Art.....	341	Barometer.....	251
American fruits.....	85	Beer.....	31
Ancient modes of writing.....	53	Beer and Porter.....	32
Ancient Gardens.....	151	Betel-nut.....	73
Ancients, the.....	45	Birch.....	308
Animal Life.....	363	Bird of Paradise.....	130
Annihilation.....	231	Biscuit.....	184
Anno Domini.....	46	Bitumen.....	361
Annual Plants.....	35	Blackberry.....	316
Antiquity of letters.....	52	Black-walnut.....	176
Apothecary.....	139	Bleaching.....	91
Aquafortis.....	359	Boa-constrictor.....	371
Aqueducts.....	399	Boats.....	243
Arabic Numerals.....	323	Body and Mind.....	28
Arbor-Vitæ.....	300	Books, by whom made, and how.....	49
Arch of Titus.....	401	Botanic Garden.....	152
Arrow-root.....	72		

	PAGE		PAGE
Brandy.....	76	Chestnut.....	284
Brass.....	205, 213	Chestnuts.....	87
Bread-fruit tree.....	277	Chintz.....	102
Bricks.....	164	Chloroform.....	354
Bronze.....	178	Christian Art.....	336
Brooks.....	270	Chronometer.....	200
Brushes.....	136	Cigars.....	143
Busts.....	156	Cinnabar.....	211
Butter.....	40	Cinnamon.....	72
		Citron.....	78
Caffre huts.....	389	Classes of Animals.....	363
Calcination.....	208, 215	Classes of Plants.....	21
Calico.....	102	Classic Art.....	336
Caloric.....	95	Classics, the.....	47, 181
Cameos.....	128	Clay.....	241
Camphene.....	94	Clepsydra.....	197
Camphor.....	349	Climates.....	22
Canals.....	272	Clocks and Watches.....	198
Candles.....	90	Clothing—Wool, Cotton, Silk, and Fur.....	98
Candlesticks.....	178	Cloves.....	72
Canoes.....	310	Coals.....	96
Cantharides.....	355	Cochineal.....	348
Capers.....	89	Cocoa.....	68
Caraway.....	72	Cocoa-nuts.....	80
Carnelian.....	124	Cod.....	382
Carpets.....	191	Coffee.....	66
Carrara Marble.....	152	Coliseum.....	399
Cartoons.....	120	Combs.....	132
Cashmere Shawls.....	120	Combustion.....	66
Castor Oil.....	356	Commerce.....	37, 147
Catacombs.....	187	Condiments.....	69
Catalpa.....	304	Conquerors.....	253
Cathedrals.....	406	Conservatory.....	84
Cattle.....	146	Cooking.....	71
Caxton.....	50	Copper.....	213
Cedar.....	175	Copperas.....	359
Cedar of Lebanon.....	298	Coral.....	123
Central Fire.....	229, 232	Cork.....	288
Century.....	46	Cotton.....	100
Ceramicus.....	187	Crayons.....	345
Chamois.....	116	Creation.....	12
Cheese.....	41		

	PAGE		PAGE
Crops and harvest.....	24	Elgin Marbles	160
Crustacea.....	364	Ellora.....	394
Crystallization.....	64	Elm.....	305
Culinary Vegetables... 149		Enamel.....	342
Curiosity	223	Engrafting	85
Currants.....	83	Engraving	56
Cypress	299	Ether	353
Dates and palm-trees ..	81	Etruscan vases	186
Day and Night	193	Evaporation.....	58
Decalogue	51	Excrescences	290
Decomposition.....	71	Explanation of Terms in Architecture	8
Delta	270	Explanation of Terms in Natural History.....	7
Deluge, the	90	Experience.....	223
Density, Hardness, and Softness	58	Extinct Species.....	226
Deserts.....	283	Faculties	57
Design	328	Fans	114
Diamond.....	122	Famine.....	20
Disintegration	243	Farm	145
Distilled Spirits.....	30	Feathers.....	129, 176
Domestic animals	16	Fermentation.....	27
Domestic utensils	187	Figs.....	83, 279
Down	176	Figurative meaning of Bread	28
Dresden China.....	184	Fine Arts.....	164
Drugget.....	192	Fire, uses of	97
Drugs	139	Firearms	351
Ductility	202	Fishes	17, 379
Dutch Reformed Church, N. Y.....	408	Fishing	24
Duties to Animals.....	19	Flaxseed.....	107
Dyeing	343	Flux	104
Dye-stuffs.....		Food, different kinds... 16	
Earthquakes	235	Forests.....	273, 281
Earth, the.....	11, 222	Forks	109
Ebony.....	174	Form of Birds	375
Ecclesiastic Architecture	406	Fossil Remains	226
Edible Birds'-nests ...	353	Frankincense	358
Eider-ducks	177	Fresco.....	341
Elephant	132	Fuller's Earth	241
Elephanta	393	Fulton.....	260

	PAGE		PAGE
Furs	118	Hedge	174
Fusibility	202	Hemp	107
Fusion and Solution ...	59	Hemlock	297
		Hessian flies	385
Galileo	170	Herbivorous animals ...	19
Galleys	244	Herculaneum	179
Galls	290	Herrings	381
Gamboge	348	Herschel	171
Gardens	148	Hibernation	373
Garden Fruits	150	Hickory	306
Geology	222	Hieroglyphics	324
German Silver	205	Honey	67
Gilding	208	Horizon	194
Ginger	72	Horology	199
Glass	167	Horticulture	25
Glazing	242	Hour-glass	198
Glue	166	House Furniture	174
Gnomon	197	Houses	152
Gold	205	House Flies	384
Gothic Style	405	Human Food	138
Goths	157	Human Hand	35
Grain and Bread	25	Human Organs	34
Granite	155	Hunting	23
Grapes	73	Hydrogen	253
Grass and Hay	146		
Grecian Dominion	158	Ice	264
Group of Laocoön	182	Icebergs	272
Gum Arabic	349	Idleness	226
Gunpowder	350	Ignorance	224
Gutta Percha	281	Illuminating	332
Gypsum	162	Illustrated Books	334
		India-Rubber	279
Habit	225	Indigo	346
Habits of Birds	376	Ink	324, 53
Hardware	358	Insects	382
Hats, their uses		Instruction	224
Hats and Bonnets	114	Intelligence	34
Hawthorn	315	Intoxication—Effects ..	32
Hazel		Inundations	271
Hebrew, Greek, and		Iron	217, 201
Latin	46	Isinglass	353
		Ivy	316

	PAGE		PAGE
Japanning	358	Locust-tree	379
Jelly.....	166	Log Cabins.....	300
Jet	126	Logwood	377
Jungles.....	276	Lord Rosse.....	171
Jupiter.....	159	Lucifer Matches.....	94
Kayaks.....	244	Macaroni	30
Kine and Cattle.....	37	Mace.....	18
Knives	189	Machines	103
Laburnum	305	Mackerel	328
Lac	360	Madder.....	346
Lamps.....	90, 178	Magnolia.....	303
Landscape	329	Mahogany	174, 279
Language, our own....	47	Mahometans.....	158
Lantern of Demosthenes	396	Malleability	280
Lapidary	121	Malt	31
Larch	298	Mammalia	18
Latent and Sensible Heat	95	Mammoth.....	226
Laurel	300	Man and Woman, the	
Lava.....	232	first.....	14
Lawn	173	Man's Dominion.....	22
Laws of the Twelve		Manufactures of Wool..	99
Tables	52	Maple.....	313
Lead.....	214	Marble	155
Lead pencils	325	Marine Views	329
Leather	115	Mariner's Compass	221, 245
Leeches	354	Masons	407
Lemons.....	77	Mastic.....	356
Letters.....	322	Matter and Spirit	57
Lilac	314	Mattresses	176
Lily.....	320	Mausoleums.....	401, 405
Time.....	165	Mechanic	148
Limes.....	77	Mechanics.....	103
Limestone	240	Merchant	148
Linden	312	Merchant Ship.....	256
Liquorice	73	Metals	201
Lithography.....	56	Metallurgy.....	204
Lithophytes.....	388	Meteorology.....	251
Lizards	370	Mexican Ware.....	185
Locomotion	33	Microscope.....	171
Locusts.....	385	Migration	374
		Milk	39

	PAGE		PAGE
Mills	26	Old Masters.....	334
Mineralogy	203	Olives	89
Minerals	37	Olive Oil.....	41
Mineral Springs.....	139	Opium ..	140
Minerva	160	Optical Glasses	170
Mirrors	169	Optics.....	328
Models	157	Oranges	77
Modern Italians.....	158	Organization	34
Molasses.....	62	Organs of Plants.....	35
Molluscs	364	Oriental Languages ...	183
Mortar	166	Ostrich	129
Mosaics.....	331	Orang Outang	274
Mosque of St. Sophia..	406	Oxalic Acid	359
Mountain Ash	314	Oxygen.....	263
Movement of the globe.	12		
Mustard	52	Pagodas	394
Myrrh.....	357	Painting.....	326
		Pampas	283
Narcotics	140	Pantheon	400
Natron	361	Paper, and its uses ...	47
Nature and Art.....	163	Paradise.....	149
Nautical Almanac.....	251	Parchment	47
Nautical Instruments ..	250	Parian Marble.....	159
Navigation.....	250	Parthenon	160, 400
Navy.....	252	Particles and Pores....	59
Needles	109	Pasturage.....	23
Nests of Birds	378	Peaches	88
Newspapers.....	50	Pearls.....	125
Night and Sleep	13	Pens	53
Nitre.....	350	Pepper	71
Nutmeg	72	Perfumes	145
Nuts	87	Perpetuity.....	231
Nymphaea.....	321	Perspective	328
		Petroleum	392
Oak.....	284, 285	Pewter	205
Oasis.....	283	Pharmacy.....	391
Obelisk of Luxor.....	162	Phidias.....	160
Obelisks—in Rome....	161	Phosphorus	95
Observation	224	Pictures	326
Ocean	266	Pineapples	79
Oil-cloth	192	Pines.....	292
Oil-painting	333	Pins	108

	PAGE		PAGE
Pipes	144	Quicksilver	210
Pirates	254	Quills	176
Pitch	296	Quinces	88
Pictorial Instruction ...	334		
Planets	14	Rail Cars	260
Plantations	104	Raisins	83
Plane-tree	130	Raspberries	89
Plaster Casts	163	Reading and Writing, 43,	323
Plating	183	Remains of Antiquity ..	179
Platinum	202	Rennet	41
Plums	88	Reptiles	367
Points of the Compass .	195	Resin	296
Pole Star	248	Respiration, Lungs and	
Polypi	387	organs	15
Pomegranates	84	Rhinoceros	275
Pompeii	179, 331	Rice	36
Porcelain	183, 241	Rivers	269
Porphyry	161	Roman Baths	403
Portraits	326	Roses	317
Potato	278	Rosewood	174
Potatoes	29	Rye	30
Pottery-ware	183		
Poultry	17	Saffron	73
.....	147	Salmon	381
Prairies	283	Salsette	394
Praxiteles	160	Saltpetre	350
Precious Stones	121	Salts	137
Predaceous Animals ...	19	Sand	241
Primary, Secondary, and		Sandal-wood	356
Tertiary formations ..	239	Sandstone	243
Printing	48	Schools of Art	336
.....	324	Sealing-wax	324
Printing-press	49	Seals	124
Producers and Consumers	22	Sea-water	267
Prunes	83	Senses	57
Public Edifices	153	Sevres China	184
Public, the	44	Sewer	215
Public schools	43	Sewing Materials	119
Public Thanksgiving ...	25	Sharks	380
Pyramids	391	Shells	364
		Sherbet	78
Quartz	242	Ships	245

	PAGE.		PAGE.
Silk—Silk-worm	110	Tapestry	119
Silver	200	Tar	296
Slate-stone	172	Tartaric Acid	356
Snowball	815	Taxes	44
Snuff	143	Tea	60
Soap	126	Teak-tree	274, 276
Solar Microscope	171	Teasel	106
Solids, fluids, and gases	58	Telescopes	177
Solomon's good woman	106	Temperance and Glut-	
Solution and Crystals	60	tony	20
Spawn	381	Temple of Juggernaut	394
Specific Gravity	219	Tenacity	202
Spectacles	171	Tents	390
Spermaceti	91	The Elements	230
Spices	69	The Magnet	221, 245
Spiders	386	The Mediterranean	249, 268
Spirits of Turpentine	295, 362	The Meridian	194
Sponge	138	The Vintage	75
Spontaneous combustion	94	The Whale	91
Spoons	188	Time-pieces	193
Springs	268	Tin	216
Spruce	297	Tobacco	142
Starch	27	Tombs—Prison, N. Y. ...	408
Statues	156	Tortoise	135
Steam	264	Transformation of In-	
Steamships	259	sects	111
Steel	220	Translation	47
Steppes	283	Trinity Church, N. Y. ...	408
Stimulants	141	Tulip-tree	304
Stork	379	Turks	158
St. Peter's Church	408	Turmeric	72, 346
Strawberries	87, 317	Turpentine	295
Sugar and Sugar-cane	63	Tyrian Purple	344
Sumach	319		
Summer and Winter		Useful Arts	164
Solstices	195	Useful Insects	386
Sun-dial	196	Uses of Birds	377
Sun, Moon, and Stars	12		
Table-salt	69	Varieties of the Human	
Tamarinds	84	Race	11
Tanning	115	Varnish	358
		Vases	185

	PAGE		PAGE
Vatican	182	Wedgewood ware	184
Vegetable food	19	White Lead	214
Vegetable Mould	229	Wigwams	389
Venomous Reptiles	373	Wild Animals, Game	16
Vermilion	211	Willow	283, 310
Victory	253	Wine	73
Vikings	255	Wooden Clocks	200
Vision			
Volcanoes	232	Xanthian Marbles	160
Vulture	378		
		Year	194
Wafers	324		
Walrus	134	Zinc	214
Water	268	Zoology	389
Water-colors	342	Zoophytes	389
Wax	91		









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